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The distant proximity of infrastructural harm: the contested and (in)visible dynamics of waste politics in Athens, Greece

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ABSTRACT

This paper investigates the entanglements of waste infrastructures and harm in the wider Athens region. It focuses on Fyli landfill, which is currently the only formal waste management facility to serve the entire region. Associated with pollution, privatization, and allegations of corruption, the landfill has been formative of differential modes of uncertainty, interruption, and (in)visibility. By paying attention to the infrastructural contestation surrounding Fyli landfill, we conceptualize waste infrastructures as techno-political devices that engender harm. Our paper, first, examines the ways in which the spatio-temporal modalities of harm play out within this context, and secondly, rethinks modes of contestation and (in)visibility in relation to urban infrastructures. It argues that thinking through harm further elaborates the complex enmeshment between spatio-temporal and moral dynamics of infrastructures and forms of disruption, accountability, and participation. Hence, while we rethink waste infrastructures through harm, we also attend to the infrastructural codifications of harm.

KEYWORDS

Waste; contestation; harm; invisibility; spatio-temporality; infrastructure

Introduction

Italo Calvino (1974, pp. 114–116) portrays the fictional city of Leonia as refashioning itself every day. The city 'renews' itself through a metamorphosis which is technopolitically determined by the discarding of its rubbish. Calvino's Leonia represents a twofold, complementary process. On the one hand, Leonia wakes up every day in new bed linens, surrounded by brand new household appliances and unused materials. It 'purifies' itself by throwing away the previous day's waste. As Calvino notes, though, the refuse that Leonia generates to feed this everyday 'purification' ritual haunts the city, endangering its very existence. The city is surrounded by unstable mountains of garbage which threaten to collapse at any moment, engulfing it in its own waste.

There are several cities in Greece that can be viewed through Calvino's urban allegory as meta-Leonias – cities where the inevitable 'event' of collapse has already occurred. For example, for several months between 2010 and 2015, in Pyrgos, a city in the northwest Peloponnese, rubbish collection and disposal were completely interrupted due to an ongoing waste management crisis. This disruption eventually left more than 10,000 tonnes of trash uncollected in urban space. Other Greek cities have also been faced with similar crises. However, Calvino's story also invites us to think of the durable and long-lasting harms caused by such lingering crises. One of the most distinct and

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longstanding cases of waste management crisis is that which is occurring in Athens. This is a crisis that is marked by fierce ongoing controversies, injustice, and pollution. Athens, and the greater Attica region, which accommodates almost half of the country's population, rely on Fyli landfill for the everyday disposal and treatment of their waste. Located at the base of Parnitha Mountain in Fyli municipality, approximately 12 km west of Athens (Figure 1), this immense landfill started life as a local open dump in the 1960s. Gradually, and after undergoing a series of technical and legal interventions and transformations, in 1991, it became the only formal, active landfill for the entire region.[1] Since then, thousands of tonnes of garbage get buried at the site on a daily basis. The flow and accumulation of such a volume of waste in one location has generated an artificial mountain that is visible from far away.

This constant flow of discarded matter to Fyli has also made possible the transfer of other 'things' that likewise have become 'matters' of ongoing disputes. Fyli landfill operates in a relatively 'successful' manner facilitating the continuous transfer of garbage from the city to its margins, with disruptions to its service only temporary and not always apparent across the wider cityscape. However, the landfill's repercussions and governance have been contested. Its wider impacts have produced an 'infrastructure' of harm that permeates various scales and contexts. The European Committee on Petitions (2014, p. 16), which visited the site in 2013, stated in a working paper evaluating waste management in Greece that the 'degradation of the environment in Fyli will be a monument of environmental mayhem, sickness and human suffering at least for the next three generations living in the area unless something more fundamental is done to restore the area'. Apart

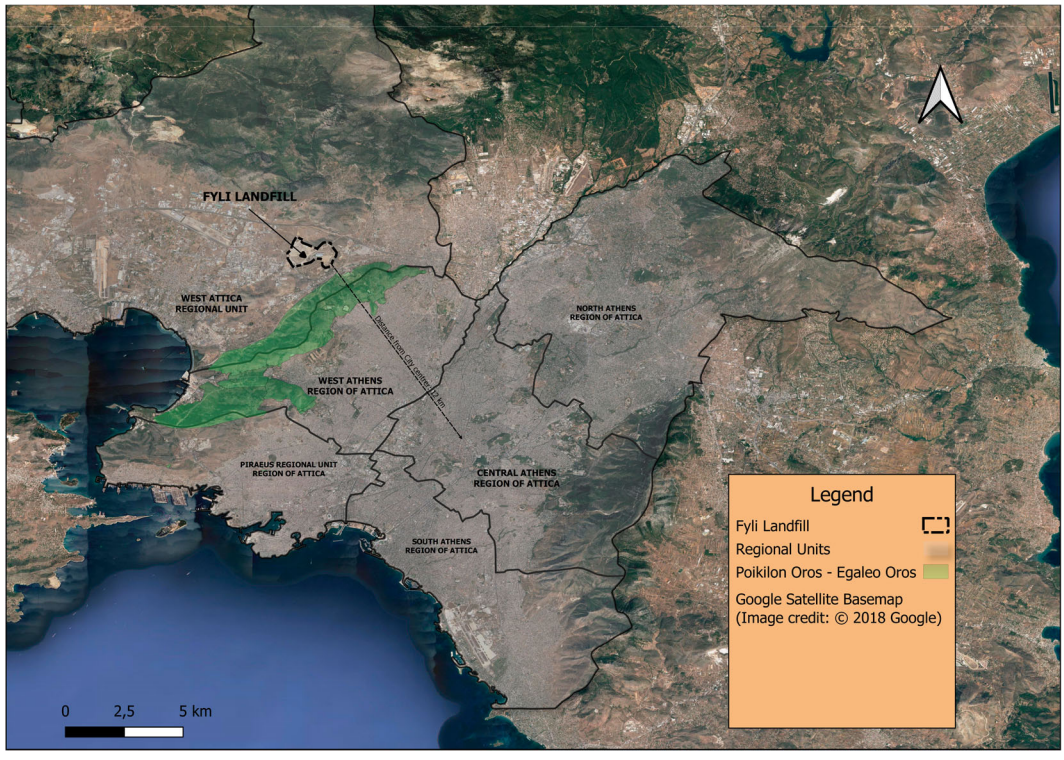

Figure 1. Map indicating the south, west, central, and north Athens regions in relation to Fyli landfill and the West Attica regional unit. Image credit: @ 2018 Google.

from the environmental degradation, pollution, and health concerns which this particular waste infrastructure has been causing, it has also been associated with socio-political, legal, technological, and economic practices that engender injustice, uncertainty, and urban marginalization, thereby unequally reshaping the everyday experience of the city.

Our paper attends to the various instances of infrastructural contestation and controversy around the landfill to examine, first, the ways in which spatio-temporal modalities and manifestations of harm play out within this context, and second, to rethink modes of contestation, (in)visibility, and accountability in relation to urban infrastructures and their deleterious effects. As we show, while the landfill (in)visibly fulfils its planned function, it does so by generating differential modes of long-lasting and (in)visible harms. Odours and environmental degradation, public health concerns, as well as allegations concerning financial misconduct and technical problems, have been (re)shaping everyday imaginaries, uncertainties and contestation related to Fyli landfill. Though not directly causing a breakdown in the landfill's operation, these harms do, however, disrupt the everyday lives of local communities, thus inhibiting the articulation of alternative urban futures. Here, we claim that the ways in which these diverse dimensions of the landfill intertwine – the effective facilitation of waste flows to maintain urban 'order' and the harmful effects that this process produces – challenge the assumed homogeneity and closed character of infrastructural systems.

Research for this paper is based on our fieldwork in Athens and other locations in Greece. Yannis Kallianos has been conducting research on waste infrastructures in Greece since 2014, with a particular focus on Athens and the wider Western Attica area. Long-term research by Dimitris Dalakoglou on waste infrastructures in Athens and east Attica has also fed into this paper. Between 2014 and 2021, we interviewed and held discussions with local residents, environmental activists, and government officials. We also studied legal and official archives and press, as well as documents produced by local groups. Fieldwork also involved participation in events and actions organized by local committees and environmental activists, as well as the use of participatory visual methods (see Gerousis et al., 2019).

Our approach to harm aims to contribute to 'infrastructural inversion' (Bowker, 1994), a process where the 'normally invisible Lilliputian threads' (Star & Bowker, 1999, p. 34) of infrastructural arrangements are brought to the foreground (see also Harvey, Jensen, et al., 2018, p. 3; Hetherington, 2019, p. 6). In this sense, harm allows us to examine infrastructures as political devices whose spatio-temporal dynamic reshapes social relations and modes of governance (Barry, 2001). It also enables us to challenge established epistemological distinctions between the *political* and the *ecological*, and thus between society and nature. In this way, investigating harm offers us a framework for examining society and nature's deep entanglement in times of 'late industrialism' (Fortun, 2012). We therefore ask: What are the spatio-temporal and moral dynamics of infrastructural harm within this context? How can infrastructural harm help us rethink the multiple *functions* of infrastructure? In what way does the conceptualization of infrastructure through harm broaden or problematize certain aspects of disruption and contestation? These questions are employed as an analytical guide through which to further explore the ways in which modern infrastructure engenders harm.

Rethinking the *work(ings)* of infrastructure through harm

The ongoing financial and political crisis, as well as the broader impacts of environmental change, have had far-reaching consequences for infrastructures across the globe. These processes further problematize the idea of infrastructures as stable and uneventful systems which materialize unending (economic) growth in liberal modernity (see also Edwards, 2003; Wakefield, 2018). Rather, they

indicate that infrastructures are permeated by disorder, uncertainty, and disruptions, as well as by multiple social and political conflicts (Graham, 2010a; Kallianos, 2018; Zeiderman et al., 2015). Contestations around infrastructure are important events that transform socio-technical arrangements – such as logistics – 'from a technical science into a field of political struggle' (Cowen, 2010, p. 83), thus unveiling their political dynamics (Winner, 1980). In many ways, the severe and multiplying 'infrastructural contestations' (Giovanopoulos et al., 2020) that have been taking place all over the world throughout the last decade do not merely draw attention to the malleable and relational qualities of infrastructures (Furlong, 2011), but also expose the direct and indirect harms that these systems generate. They reveal that socio-technical arrangements are co-formative of harms, which in many instances are enacted parallel to, or because of, their function. The recent rethinking of infrastructure has paid close attention to its deleterious effects – its splintering (Graham & Marvin, 2001), unequal (McFarlane, 2010), violent (Rodgers & O'Neill, 2012), and even brutal (Truscello, 2020) consequences. Within this context, Murphy (2013, p. 106) employs the term chemical infrastructure 'to highlight the uneven spatial and temporal distributions of industrial chemicals and their diverse effects on life'. This is related to what Nixon (2011, p. 2) calls 'slow violence', that is, 'a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all'. For Hecht (2018, p. 130), the fact that certain infrastructures – which previously might have been considered harmless – have now been identified as toxic, resignifies these 'materials of modernity' as 'instruments of slow violence'.

In this article, we employ infrastructural harm as a critical analytical lens through which to further examine the multifaceted 'work' of infrastructure. Building upon the conceptualization of infrastructure as having the capacity to 'operate on multiple levels concurrently' (Larkin, 2013, p. 335), we are interested primarily in the fact that while certain infrastructures fulfil their intended function, they do so through generating harm. The 'work' of infrastructure, then, is used here to refer to the ways in which infrastructure's multiple dynamic exceeds its planned function to enable – and/or extend to – other material, socio-cultural, and political arrangements and processes, which can also be generative of diverse and (in)visible harms. Therefore, the realization of such (harmful) entanglements should be conceptualized as an integral part of the 'workings' of infrastructure (see also Kanoi et al., 2022). Attending to infrastructure's 'work', then, also means examining how its deleterious effects co-shape modes of (in)visibility, accountability, and participation. Hence, we understand the damage and violence stemming from infrastructures as part of broader arrangements enacted by the *workings* of these systems.

These approaches lead us to claim that modern infrastructures operate through a *normalized* paradox.[2] Star (1999, p. 380) observes that '[o]ne person's infrastructure is another's topic, or difficulty', while Howe et al. (2016, p. 548) consider that while infrastructure is developed 'to mitigate risk, it also involves new risks as it comes to fruition'. This contradictory quality of infrastructures, as functional and life-affirming (for some) and harmful (for others) (see also LaDuke & Cowen, 2020, p. 264), provides new insights into the association between infrastructure functionality, failure and order. Additionally, the interconnection of these seemingly antithetical operations further problematizes the idea that 'infrastructures become visible upon breakdown' (Star, 1999, p. 382).[3] This line of thought, as Schwenkel (2015, p. 522) explains, is associated with the Heideggerian (1962) idea that the essence of 'things' – their 'thingness' (Hall, 2014, p. 160) – is revealed to us during moments of failure and breakdown. When things become 'present-at-hand' (Vorhanden) – Heidegger's (1962) concept to describe a process of unmasking that makes things 'present in consciousness' (Harman, 2010, p. 19) – they tend to expose previously hidden arrangements. Hence,

crises and disruptions can 'radically transform urban life' (Graham, 2010b, p. xi), thus reflecting the complex, fragile, and interdependent character of infrastructures – which 'itself becomes a potential cause of failure' (Little, 2010, p. 28).

Here, we expand notions of disruption and functionality to include modalities of harm. Instead of approaching disruptiveness as merely an issue associated with the interruption of flows and failure, we consider the ways in which the work of infrastructure can be disruptive of potentially more equal and just ecological and socio-political arrangements. As we indicate, the various environmental and socio-political harms associated with Fyli landfill do not only affect the everyday life of nearby urban communities – through exposure to various forms of pollution, related health concerns, and economic misconduct allegations; these harms also reshape or even obstruct infrastructural and urban imaginaries and practices that can be deployed towards collective well-being. However, such turbulences and harms stemming from infrastructure functions do not always force infrastructure collapse or breakdown. As Harvey, Jensen, et al. (2018, p. 13) explain, internal disruptions and contradictions 'do not necessarily disable infrastructural systems' (see also Barry, 2015). Nevertheless, they become disruptive for the environment and the life of people who are directly or indirectly affected by such processes (Barry, 2013, p. 102; Dalakoglou & Kallianos, 2014, p. 530). Hence, by disrupting particular 'existing orders, collectives, materials and relations' (Liboiron et al., 2018, p. 334), infrastructural harm also reshapes modes of power, (in)visibility, marginalization, injustice and connectivity. The disruptive effects of such harm should be approached as co-constitutive of the 'normal(ised)' set of practices that permeate infrastructure politics. Approaching infrastructure through harm enables a wider rethinking of the dynamic and effect of this 'matter' vis-a-vis its necropolitical (Mbembe, 2003; Truscello, 2020) dimensions which go beyond its visible and intended functions and flows. It helps us expand our analytics of disruption and contestation by understanding harm as a process that reshapes and hinders imaginations, associations, and futures.

Between concealment and visibility

Fyli landfill was just one of many active dumps in Athens during the mid-1960s. Until recently, the Attica region hosted several of these small open dumps, which nevertheless still remain an important part of waste treatment in Greece, where the predominant official method is land-filling. This has resulted in a 'dump regime' (Reno, 2015, p. 563) that reconfigures various environmental and socio-political dynamics. Fyli soon grew from a local dump to the only legal waste management facility serving the entire region, and in the process, completely reshaped the local landscape. Fyli landfill is a socio-technical arrangement that defines the wider political economy of waste treatment and waste flows in the country as well as co-shaping modes of urban governance (Kallianos, 2018).

'The dump' (χωματερή [*homateri*]), as it is casually referred to in Athens, consists of various operations. Literally adjacent to the current active facility that started operating in 2006 are the previous landfills and open dumps that operated there from the 1960s until the early 2000s.[4] While these sites are considered distinct by the regional authorities, since they have been given different names and are governed by different legal and technological procedures, their coexistence and combined effect requires that we treat them as co-constitutive of the same dynamic. In addition, according to the Waste Management Authority of Attica region (ESDNA), the landfill is part of the Integrated Waste Management Facility of Western Attica that also includes a mechanical recycling and composting facility, two leachate treatment plants, a biogas plant, as well as the only medical waste incinerator in the country. These operate under concession contracts. Currently,

with its capacity having been extended several times to accommodate the capital's waste, the landfill has literally been filled. With no immediate alternative in sight, since finding sites for new waste management facilities has been a highly conflictual process for Greek authorities (Dalakoglou & Kallianos, 2018), the regional government decided to once again extend its operation. For local activists, these new temporary 'emergency' extensions, which began being implemented in 2017, signal the long-term continuation of the landfill's operation.

In early 2014, we arranged to meet with two activists from one of the local anti-landfill committees. Right at the start of our meeting in Ano Liosia, a suburb of West Attica which is part of Fyli municipality,[5] they asked us whether we had been to the landfill. We were told how critical it was, before anything else, to see the site itself, which they called the 'cancer landfill' (καρκινοχωματερή [*karkinochomateri*]). While the landfill is not visible from Athens, as it is concealed by a part of Egaleo mountain,[6] it actually lies very close to the city. As such, the landfill co-produces both distance (through concealment) and proximity (since it remains within close range of the city centre).[7] Additionally, Egaleo mountain works as a natural boundary between Athens and West Attica (Figure 1). It separates the city, where glorified materials belonging to the (ancient) past are displayed (see Hamilakis, 2007), from heavy industrial and infrastructural materialities that are situated primarily in West Attica.[8] For the two activists, it was imperative that we cross this *boundary* to witness 'the crime'. For them, to show us the landfill itself seemed to serve a critical revelatory function, as if, by experiencing its volume, form, matter, and odour, we would immediately and viscerally apprehend the complex arrangements that shape its dynamic.

To reach the landfill, we had to leave the main road and follow a somewhat narrow and potholed road to its principal entrance. This felt odd given that the road is used daily by heavy machinery and trucks carrying tonnes of garbage and other materials. Thus, the smooth operation of this vast landfill, which spans approximately 100 hectares, depended on a rather bumpy road. During the following hours we were taken on a tour of the site to see an ancient wall, part of which is next to the landfill (Bourikos, 2019a). The landfill also seemed to 'consume' the new municipal cemetery adjacent to it. The cemetery, they said, reflected how the landfill haunts them 'even in death'. They also shared data they had gathered over the years to make their claims against the landfill visible and credible. This data included photos indicating the varied types of harm configured around and through this infrastructure: a dead body found in the landfill in 2010; openly discarded medical waste from 2006 and 2010; a young child with a dermatological disease; deformed animals found around the landfill; leachate pollution; discarded e-waste; livestock being raised literally next to the landfill; discarded parts of animals; illegal dumping of sewage sludge; parts of the ancient wall next to the landfill. These photos, apart from indicating important evidence of extreme pollution and lack of environmental measures, also evidence the different manifestations and entanglements of infrastructural harm created through the lasting effects of slow violence. This practice of *evidencing* highlights that opposing infrastructural harm entails a certain grammar of visibility that allows emotions and the experience of harm to be conveyed.[9]

Practices of concealment and visibility have always been constitutive of the modern infrastructural form (Graham & Marvin, 2001).[10] In fact, according to Mau (2004, pp. 3–4), 'the secret ambition of design is to become invisible, to be taken up into a culture, absorbed into the background'. As Berg (2017) also explains, '[d]umps, along with landfills, incinerators, waste-to-energy plants are technologies of concealment'. Nevertheless, this concealment is always temporary, since as Hird (2013, p. 114) reminds us, even when successful, 'in engineering terms', landfilling always carries with it a dimension of 'failure' since 'waste never leaves; it is never fully contained or controlled'. One repeated story of reported leakage concerned recurrent odours coming from the landfill.

These odours, whose spread depends on wind direction, affect the everyday lives of people living nearby – for example, by not allowing them to keep the windows of their houses open. As Reno (2016, p. 53) states, odour talk expresses 'a violation of home' by transgressing the constant attempt to maintain the assumed dichotomy between purified and 'dangerous' spaces promised by modernity. The question of what then becomes visible or not, or rather, which aspects of infrastructural arrangements are concealed or revealed, should be understood as a technopolitical process situated within and defined by 'particular structural conditions' (Kuchinskaya, 2014, p. 2). Here, we argue that by letting certain things *leak* while keeping other things veiled, the landfill oscillates between (as well as engenders) uneven forms of concealment and visibility.

Keeping matters in and *leaking* them out

To understand what forms of harm Fyli landfill generates, we consider particular events, and in so doing, indicate how land-filling has been inflected with socio-political antagonism and contestation in Athens. Within this context, certain modes of (in)visibility emerge either as technologies of urban governance or as practices that inform social contestation.

Overall, the politics of waste infrastructures in Athens, and Greece, are permeated by long-term controversies. The (hi)story of Fyli landfill has been defined by repeated contestation that has (re)configured modes of urban governance. Athens' strong dependency on the landfill for the disposal and management of its waste renders Fyli a critical infrastructure through which the fragility of the modern city can, at once, be exposed (Soppelsa, 2009). Hence, blocking the circulation of waste flows has been an important strategy for numerous groups into making their claims and demands visible. During the summer of 2005, a struggle erupted after the state decided to start using Fyli landfill as a site where sewage sludge would be discarded. To resist this decision, an inter-municipal committee was created that was able to mobilize many people. After months of periodical blockades, protests, and legal struggles, the disposal of sewage sludge in the landfill was eventually blocked. Again, in October 2011, the landfill, along with other waste infrastructures in Athens (e.g. the central depot for rubbish trucks), were occupied for days. These occupations, which were organized by the Panhellenic Federation of Local Government Employees, emerged as part of a broader response to the implementation of austerity measures by the state and the so-called troika (the European Commission, the European Central Bank, and the International Monetary Fund). This landfill occupation caused severe interruptions to waste flows, leaving thousands of tonnes of waste uncollected in Athens city centre. Garbage strikes and blockades 'deploy the power of dirt to creatively subvert ordering paradigms' (Fredericks, 2014, p. 542), thus reconfiguring waste infrastructure into the '*political terrain* for the negotiation of moral-political questions' (Von Schnitzler, 2013, p. 671). However, it was the struggle that broke out in December 2010, just months after the eruption of the economic crisis, that became the most dynamic waste conflict in the country. During that period, Keratea, a small town in east Attica, rose against the violent imposition of state plans to build a waste landfill in the area. The conflict that ensued between local residents and the multiple riot police forces sent to enforce the decision was marked by extreme police violence and invasions of the local town aimed at crushing the dynamic local resistance (Dalakoglou & Kallianos, 2014). Eventually, in April 2011 the state was forced to withdraw its plans. While Fyli landfill was not directly involved as a site in the struggle, its wider dynamic, nevertheless, shaped waste politics in the region, since stories about its harms circulated widely (Harvey, Kallianos, et al., 2018, p. 134). This reflected both the local community's long-term distrust of the state and indicated the ways in which the affective power of infrastructure transcends contexts (Knox, 2017).

Thus, when in 2017 the state and ESDNA decided to once again expand the landfill, this became the catalyst for the expression of strong discontent. Since then, several temporary symbolic blockades of the landfill's entrance by local activists have taken place. Central to waste blockades is their capacity to challenge state legitimacy, which as Fredericks (2014, p. 534) explains, is strongly associated with cleaning the city and managing waste. However, these temporary blockades were not used in order to cause an infrastructure failure through the obstruction of waste flows. Rather, they were mostly concerned with letting other flows circulate, such as information, people, stories, and imaginaries that could help make the struggle against the harms caused by Fyli landfill visible and legitimate. Infrastructure blockades do not merely disrupt flows, but also make other flows possible; by obstructing certain flows while letting other things *leak*, they help 'nurture alternative social, economic, and political practices' through the creation of 'new circulations and political possibilities' (Davis, 2021, p. 2, 4).

In March 2018, sections of two reports on environmental pollution at the landfill were revealed by the media. The reports, which were ordered in 2015 by the Fyli municipal authority, described severe ecological degradation in the area due to the landfill's operation (Ziabakas, 2018). However, it took another two years for the full reports to be made public. Confirming other studies,[11] the disclosure of these documents showed that the wider area surrounding the landfill (land, air, groundwater) had been exposed to severe and extensive pollution (Hatzigeorgiou, 2020). It also indicated that one of the oldest dumps at the site contained a very high percentage of radioactive elements such as thorium-232, radium-224, radium-226, lead-210 and tritium.

The *leakage* of these documents was received by local activists as yet another unequivocal sign that the landfill must be shut down immediately, and an alternative decentralized waste management plan rolled out instead. However, this did not occur. Immediately after the reports were leaked, Fyli municipality published a statement in which it admitted that it had commissioned a private company to conduct the study. The municipality did not make its results public, it claimed, because the Greek Atomic Energy Commission (GAEC), which evaluated them, questioned their scientific value.[12] In its statement, GAEC claimed that the reports 'lacked scientific evidence', and stated that the limits taken into consideration were different from those used in either EU or national legislation.[13] Thus in an instant, a political matter was reduced to a scientific debate. The process of making such harms, and their consequences, 'observable' involves 'complex social negotiations, power struggles, and technoscientific work' (Kuchinskaya, 2014, p. 8). Auyero and Swistun (2008, p. 357) also point to the ways in which the 'labour of confusion' generated by powerful actors contributes to the production of 'toxic uncertainty', and hence to the invisibilisation of these toxic regimes.

The scientification of the debate surrounding harms generated by the landfill should be understood as co-formative of broader political processes of (in)visibilisation. As Barry (2013, p. 11) notes, '[m]aking things public … is a strategy that can be employed either to politicise or to depoliticise a situation'. In many ways, in the context of waste, this is not uncommon. By being presented as merely technoscientific work, waste management is generally considered to be about the (re)organization and management of the 'problem of waste'.[14] As Gregson and Crang (2010, p. 1026) observe, '[t]he matter of waste becomes fixed and limited through management'. By bringing to the fore the technological process at work, it also works to conceal the political dimensions of such arrangements. Another incident also reveals the work of scientification and expertise in the production of invisibility. A local activist admitted having a hard time understanding certain technical processes concerning the landfill during the meetings of a local committee. The technical jargon being employed by ESDNA and local authorities, as well as in EU and national legislation, creates an almost impenetrable 'wall' that keeps things in. 'It makes it a lot more difficult to make sense of what is

happening', he explained. Eventually, another participant made a glossary for the whole group that included abbreviations and explained technical terms. Such a counter-invisibilisation process constitutes important pedagogic work for shedding light on infrastructure's 'black box'. It also points to the different (affective, technological, and every-day) processes at play in the production of (in)visibility (Salas Landa, 2016), as well as to the fact that the 'production of invisibility is a function of power relations' (Kuchinskaya, 2014, p. 10). Additionally, it also suggests that infrastructure invisibility does not necessarily mean absolute concealment. On the contrary, to make something invisible might simply mean to hide it in plain sight (see also Edwards, 2019, p. 358).

The invisibilisation process, here, calls to mind Star's (1999, p. 382) assertion that '[i]nfrastructure does not grow de novo; it wrestles with the inertia of the installed base and inherits strengths and limitations from that base'. According to Fyli municipality, there is an active plan to build a renewable energy park at the site of the old inactive Ano Liosia dump that will also include recreational facilities.[15] According to local activists, though, this renewable energy facility will be constructed exactly on top of the site where the two reports showed radioactive contamination. Here, what Schwenkel (2015, p. 521) terms the 'technopolitics of visibility', that is, 'the strategic use of technology as a visual tool to "constitute, embody or enact political goals"' (Hecht, 2009, p. 15), takes place in parallel with a process of concealment that makes certain (other) infrastructural arrangements invisible.

Techno-moral entanglements of waste

Infrastructural harm has a pervasive quality. Instead of being spatially and temporally fixed, it persists by being diffused through and via its interconnection with everyday practices and processes. As the case of Fyli landfill indicates, environmental harm is intimately entangled with socio-economic and political arrangements that further solidify urban marginalization, injustice, and uneven power relations. Here, we are not merely interested in what *leaks* (or not) from the landfill – overflows that harm both the environment and living organisms – but also in those matters, flows, processes, and technologies, which, though they might not directly be part of the landfill's design and planned function, emanate from and circulate around its dynamic to become formative of particular social and environmental harms.

By remaining the only official waste management facility for the entire region since 1991, Fyli landfill has engendered the entanglement of diverse technological, legal, moral, and political arrangements that have been configured around its continual operation. Parallel to an increase in the inflow of garbage and other discarded material, these arrangements have also entailed an inflow of money. Municipalities affected by certain industrial and infrastructural operations, such as Fyli, receive annual (environmental) offsets to counter ecological harms. Fyli municipality has thus been receiving an annual sum of approximately 36 million Euros per year.[16] This is paid by all of Attica's municipalities via ESDNA and would ideally be used to counter harmful environmental effects. According to local activists, however, the funding has not been used to initiate any counter-measures. On the contrary, the offsets have been strongly linked to numerous allegations in the media and by local activists concerning corruption, clientelism, financial misconduct and non-transparent forms of governance (ToVima team, 2008a, 2008b; Vergou, 2019). As one research participant told Kallianos, when the offsets commenced, in 1991, 'It was as if the sky had opened and money started to pour down … '.

These narratives of corruption (Gupta, 2012) suggest that this continuous money inflow has been playing a very significant role in (re)shaping forms of governance and the accumulation of political power. In 2014, the then Minister of Internal Affairs stated that the municipality employed a workforce four times larger than other municipalities with a similar number of residents

(Newsdesk Skai, 2014). For a former deputy mayor for Economic Development, 'all these (things) are happening in Fyli municipality because there is the dump and so the money flows in great abundance' (Vergou, 2019). For several local environmental activists, the offsets are also directly related to the hindering of socio-political mobilization against the harms generated by the landfill. In 2019, a study was published based on data from the Hellenic Statistical Authority showing that deaths due to neoplasias in West Attica increased by 23.1% between 1999 and 2016. The percentage relating to the rest of the Attica region for the same time period was 7.6% (Bourikos, 2019b). Despite the fact that the study became quite popular in the media and in social media sympathetic to the struggle against the landfill, it did not provoke any major mobilizations. During several discussions with local activists, this lack of response was explained as part of a process which they labelled 'corrupting consciences' (εκμαυλισμός συνειδήσεων [*ekmavlismos sineidiseon*]). As Gupta (2012, p. 138) writes, narratives of corruption are co-formative of people's expectations, emotions, and imaginations with regard to the state, government officials, and bureaucrats. Here, they also indicate the (re)shaping of moral positionalities in relation to urban infrastructures. By blurring boundaries, as Muir and Gupta (2018, p. s5) explain, corruption 'calls forth efforts to clarify limits and to redefine social relations'. Such stories of harm have resurfaced periodically in the public sphere for many years. Yet, since the 2010 economic crisis, these stories are increasingly embroiled in the infrastructural politics of the landfill. Despite the annual inflow of offsets to Fyli municipality, in 2014 it was revealed that the municipality owed the state and social security funds several million euros. The financial agreement to settle the debt required the municipality to pay monthly instalments for the next 2129 years (Drymiotis, 2016).

Ofrias's (2017, p. 437) notion of the 'incentive to contaminate' is useful here, since it draws attention to how contamination 'offers some actors opportunities for gain, while being severely detrimental to others'. This approach allows us to discern how waste infrastructures are 'enrolled within ethical and political assemblages in historically specific ways that may or may not "travel" elsewhere and that may shift over time' (Von Schnitzler, 2013, p. 675). The techno-moral entanglements enacted via Fyli landfill are imbued with ethical and emotional dynamics that reshape positionalities and forms of social justice in the public sphere. Over time, these have produced 'moral ecologies' that 'constitute assessments of justice and motivations for action' (Scaramelli, 2019, p. 389). Here, waste management is approached as a process co-shaping ethical positionalities and moral concerns (Reno, 2015, p. 560) that exceed its technical facets. The 'corrupting consciences' discourse does not merely highlight the complex arrangements through which harm can be 'mobilised' and 'travel'. It also constitutes an example of how the long-term effects of such harm work through the hindering of reciprocal and more just (socio-technical) alternatives. These techno-moral entanglements enacted around waste have been formative of expectations and imaginations surrounding infrastructural futures. While they echo the necropolitical (Mbembe, 2003) characteristics of infrastructural harm, they also reflect how infrastructures are permeated by contestation and socio-political mobilizations for socio-spatial justice.

Opposing infrastructural harm

The (in)visibility of harm depends on the ways in which infrastructure arrangements entangle with ecological and socio-political processes across space and time (Appel et al., 2018, p. 12; see also Bowker, 2015; Goldstein, 2017). Harm emanating from infrastructural arrangements has a certain 'chronotopic' quality (Appel et al., 2018, p. 17); being inflected with infrastructure's capacity to unfold 'over many different moments with uneven temporalities' (Appel et al., 2018, p. 17), it

also remains open to transformation. Given the above, we contend that at issue are the ways in which infrastructural harm can be opposed. Infrastructural contestation can help shed further light on the different modalities of harm, and on its transmutations and dynamic, highlighting its 'incremental and accretive' qualities 'across a range of temporal scales' (Nixon, 2011, p. 2). Such an approach is crucial, especially when it comes to examining waste infrastructures, since as Hird (2013, p. 106) argues, landfills 'make their appearance on and in the landscape as a material enactment of forgetting'. Contestation around waste mobilizes a framework for rethinking infrastructure not only *in situ* but also in relation to harms that far exceed 'familiar temporal horizons' (Reno, 2015, p. 560). Considering, then, that infrastructural harm is an ongoing process, how can we challenge and resist those of its effects that remain concealed from us?

On 5 May 2019, several collectives from West Attica organized yet another symbolic action at the landfill. This one included both a 'symbolic occupation' of the location where yet another expansion was planned and a short tour of the landfill. A long-time member of a local coordinating committee, who is extremely well versed in the history and technological operation of the landfill, was responsible for giving the tour. Using a megaphone, he began 'mapping' the various operations inside the landfill by literally walking around it, pointing to sites, and then explaining its workings in detail. A group of about a hundred people followed him, most of them covering their noses to block the landfill's odours. This educational process was not unfamiliar; it was part of almost all the actions organized by this coordinating committee, showing us how for them, critical to opposing the landfill's harm was to point out how it worked. This practice of urban and infrastructural pedagogy also included publishing continual updates concerning the site's workings, the problems arising from its ongoing operation, as well as the various dynamics at play in relation to concessions and other financial agreements and technical changes. In 2019, as a way to further mobilize people against the landfill's expansion, they also co-organized a conference on waste management that brought together collectives from all over Greece. In light of these practices, we agree with Stamatopoulou-Robbins' contention (2014, p. 477) that protest constitutes 'part of infrastructure as an assemblage'.

Making the workings of infrastructure visible is related to the process of creating accountability, which we consider an inextricable part of opposing infrastructural harm. Such contestations around infrastructure fulfil a twofold objective: First, by making visible how infrastructure works they foster the conditions for public accountability, thus enacting a collective ethos that attempts to bring 'the material and the moral into a more satisfactory alignment' (Ferguson, 2012, p. 562). Second, they devise ways through which present and future harms can be avoided and resisted. Contestation around infrastructure is a constant reminder that infrastructural harms are not merely active in the present, but rather linger into the future – including by restricting the capacities for organizing life in other ways.

Conclusion: on the distant proximity of infrastructural harm

Infrastructure, and its effects, as we have shown with the examples above, oscillate between the near and the distant; they make that which is far away seem close, while at the same time creating distance around that which might be spatially adjacent. As relational and processual socio-technical assemblages whose dynamics and effects traverse various scales and contexts, infrastructures define experiences of space (Dourish & Bell, 2007) and time (Appel et al., 2018; Stamatopoulou-Robbins, 2020). Returning to Calvino, the importance of Leonia's allegory lies precisely in the fact that it highlights the spatiotemporal dimensions of infrastructural harm. It indicates how past and forgotten, neglected or even invisible materialities become constitutive of the present

and thus formative of the future. As Calvino (1974, p. 115) explains, 'the more Leonia expels goods, the more it accumulates them; the scales of its past are soldered into a cuirass that cannot be removed'. Leonia, then, shows that discarded objects are actually hard to let go of. The 'matter' of waste is attached to our (public) 'matters' as our present is bound to our past. Similarly, in Athens discarded waste does not actually go away. The millions of tonnes of waste that the city has been discarding for several decades still remain part of its present and future. Fyli landfill, where these tremendous volumes of waste have been accumulating, reflects how the past is sturdily and materially conjoined with the present. As Nixon (2011, p. 8) reminds us, environmental violence is also a contest over time, which fact obliges us 'to bear in mind Faulkner's dictum that "the past is never dead. It's not even past"'. Infrastructural harm, by collapsing the past into the present, or by at once making the past part of the present, becomes formative of (in)visibility, contestation and morality which reconfigure modes of power. It indicates that that which might have once been considered distant (either spatially or temporally) is always coextensive and intimate.

Studying infrastructural harm enables us to see infrastructure not merely as a facilitator of connectivity and mobility, but also as an assemblage that 'isolates, toxifies, dispossesses, and immobilises' (Truscello, 2020, p. 2; see also Dalakoglou, 2009, 2017; Dalakoglou & Harvey, 2012). Infrastructural harm, we argue, offers important analytical tools to rethink the (spatial and temporal) work of infrastructure. By focusing on infrastructural harm's ability to be 'spatially as well as temporally dispersed from the initial event or events and their full impact' (Cahill & Pain, 2019, p. 1057), we can further explore the capacity of infrastructures to have 'reach beyond a single event or one-site practice' (Star & Ruhleder, 1996, p. 113). This also suggests that we view the work of harm stemming from the landfill as part of broader necropolitical assemblages of slow violence that are active in this area. In this case, the modalities of infrastructural harm are directly associated with various other harms that have unevenly reshaped urban life in West Attica; for example, the long-term urban marginalization of Roma communities and long-term environmental pollution due to heavy industrial operations.

Examining the politics of waste infrastructures also implies that we take into account 'repositories of vulnerabilities that are likely to last longer than the political structures that produced them' (Stoler, 2008, p. 203). This is to say that we should not only look at the spaces of infrastructural harm, but also the times, speed, and the rhythm through which such effects can be manifested (Murphy, 2013, p. 106; see also Nixon, 2011, p. 13). In the context considered in this paper, the indissoluble association between environmental and socio-political harm is testimony to the complex spatio-temporal dynamic of infrastructures. Thus, the environmental harm, which will last for at least several decades, is in direct relation with the socio-political harm that echoes through the 2129 years of municipal debt. The *longue durée* of infrastructural harm obliges us to take into serious consideration the 'emergent' and 'performative' dimensions of scale (Hecht, 2018, p. 114), as well as to further examine the differential practices devised to resist such harm. By attending to the work of infrastructural harm, and to the ways in which it can both shape and hinder futures, as well as to the fact that it unevenly enmeshes and generates different times and spaces, we come to see how the *political* and *ecological* are in fact expressions of the same question.

Notes

1. In 1991, the other landfill also located in West Attica (in Schisto), was shut down.
2. Such normalized paradoxes have been considered as co-formative of modernity. Beck (1992, p. 21) argues that we live in a society permeated by risk, which is 'a systematic way of dealing with hazards

and insecurities induced and introduced by modernisation itself'. If, however, risk 'is a way – or rather, a set of different ways – of ordering reality, of rendering it into a calculable form' (Dean, 1998, p. 25), harm is not a settled category (Liboiron et al., 2018, p. 333).

3. In numerous places, especially in the 'global South', infrastructural arrangements are permeated by uncertainty and visibility (Chu, 2014, p. 365).
4. The Ano Liosia Landfill I began to operate in 1997. A new facility opened in 2003 which was referred to as Phase 1. Phase 2 started in 2006. See: https://www.kathimerini.gr/society/971194/to-chali-den-kryvei-alla-skoypidia/ (accessed 10 August 2021).
5. Fyli municipality, where Fyli landfill is situated, has approximately 45,000 residents. It is a new municipality that was created during the Kallikratis 2011 national administrative reform, and it brings together three previously separate municipalities (Fyli, Ano Liosia, and Zefyri).
6. Egaleo mountain, which consists of two major ranges, Egaleo and Poikilo, crosses a large section of west Athens.
7. We learned to pay attention to these spatiotemporal dynamics of the landfill through discussions with several participants in the local movement. They often noted the role that Egaleo mountain plays in creating a sense of distance between the landfill and Athens.
8. West Attica is also full of very significant archaeological materialities. However, for many decades the authorities have largely neglected these in order to facilitate the heavy industrialization of the area.
9. Kuchinskaya (2014, p. 67) discusses the 'symbolically overloaded, dramatic, and even hyperbolic representations' of harm in relation to the Chernobyl disaster as a process of 'hypervisibility'.
10. Schwenkel (2015, p. 523) explains that '[c]oncealing infrastructure beyond our daily sensory perception (i.e. its deliberate invisibilization) thus emerged as a novel technical and aesthetic imperative of late capitalism'.
11. We are referring here to the environmental report that ESDNA itself published in 2018 as well as to other studies. See: https://www.edsna.gr/perivallontiki-parakoloythisi-metriseis/ (accessed 10 August 2021). See also: https://www.tanea.gr/2007/01/25/greece/toksiki-bomba-katw-apo-tin-attiki/ (accessed 10 August 2021).
12. See: https://fyli.gr/apantisi-se-analithes-kai-sykofantiko-dimosieyma/ (accessed 10 August 2021).
13. See: https://eeae.gr/%ce%b5%ce%bd%ce%b7%ce%bc%ce%ad%cf%81%cf%89%cf%83%ce%b7/%ce%b4%ce%b5%ce%bb%cf%84%ce%af%ce%b1-%cf%84%cf%8d%cf%80%ce%bf%cf%85/%ce%b4%ce%b5%ce%bb%cf%84%ce%af%ce%bf-%cf%84%cf%8d%cf%80%ce%bf%cf%85-%ce%b5%ce%bd%ce%b7%ce%bc%ce%ad%cf%81%cf%89%cf%83%ce%b7-%ce%bc%ce%b5-%ce%b1%cf%86%ce%bf%cf%81%ce%bc%ce%ae-%ce%b4%ce%b7%ce%bc%ce%bf%cf%83%ce%b9%ce%b5%cf%8d%ce%bc%ce%b1%cf%84%ce%b1-%ce%b3%ce%b9%ce%b1-%cf%81%ce%b1%ce%b4%ce%b9%ce%b5%ce%bd%ce%b5%cf%81%ce%b3%ce%ac-%ce%b1%cf%80%cf%8c%ce%b2%ce%bb%ce%b7%cf%84%ce%b1-%cf%83%cf%84%ce%bf%ce%bd-%cf%87%cf%85%cf%84%ce%b1-%cf%86%cf%85%ce%bb%ce%ae%cf%82 (accessed 10 August 2021).
14. Gille (2007, p. 18) notes that 'by breaking up the concept of waste and spreading it over dictionary entries on distinct tasks of "waste management", the waste problem is presented as not only manageable but already being managed, thus solved (Gourlay, 1992)'.
15. See: https://fyli.gr/anoichtos-ilektronikos-diagonismos-me-titlo-anaplasi-kai-axiopoiisi-apokatestimenon-kyttaron-chda-chyta-ano-liosion-fylis-dimioyrgia-perivallontikoy-parkoy-kai-parkoy-ananeosimon-pigon-energeias// (accessed 10 August 2021).
16. From 1991 until Greece joined the eurozone in 2001, these offsets were being paid in drachma. According to activists the total amount paid via offsets since 2000 is approximately 600 million euros. See: https://www.efsyn.gr/ellada/koinonia/263949_o-dimos-fylis-zita-kai-ta-resta (accessed 10 August 2021).

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