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SURFACE EXTRACTION

Introduction

This essay investigates the environmental and political dynamics surrounding the AZPO Migasa pomace processing factory in Fortes, Portugal, through the conceptual framework of Surface Extraction : a method for analysing how contaminated surfaces function as active archives of environmental harm. The factory is a terminal point within the infrastructure of super-intensive olive monoculture –an industrial agricultural system characterised by high-density planting, extensive irrigation, and mechanised harvesting. In this context, the factory operates as a contact zone—where agricultural extraction collides with local ecologies, bodies, and lived space. What unfolds is not only a pattern of economic domination, but an ongoing exposure to harm, rendered through air, water, and the surface of the everyday.

In this setting, surface is not a passive backdrop, but a threshold—where injustice takes form and lingers. Emissions from the factory circulate invisibly through the air before settling onto walls, rooftops, soil, and skin. These particles accumulate as material witnesses , both forensic and affective, to the violence of extractive agriculture and the political conditions that permit its continuation.

This essay proposes a methodological and conceptual framework for treating contaminated surfaces



Contaminated surface sample collected during a field trip in the Alentejo region of Portugal, 2022.
Photo: Shengzhe Qu

as active archives and sensing devices . It asks how intertwined forms of testimony– from the personal narratives of residents to the material evidence of non-human traces –can expand how we read contact: not just as a point of interaction, but as a condition of memory, refusal, and endurance.

Drawing on interviews, documentary media, and spatial reconstruction techniques such as photogrammetry, the essay traces how surfaces record and resist. In Fortes, the residues of agriculture are not confined to the field–they enter homes, settle on bodies, and shape a political terrain where the slow violence of environmental degradation becomes visible. In this context, surface becomes a spatial and temporal index of contact: uneven, frictional, and ongoing. This ongoing contact with industrial pollution generates a profound sense of ecological grief and affective harm, transforming the residents' relationship with their environment.

The testimony of one Fortes resident powerfully illustrates this loss:

> "For those of us living here in the Alentejo, the sadness lies not only in being denied the joy of nature –something I hold so dearly– but in knowing that the damage, the damned, spares nothing and forgives no one.". (Testimony from a Fortes resident).

Fortes Novos, a small village in Portugal's Alentejo region, sits just 200 metres from an olive pomace processing factory operated by AZPO Migasa. Its presence has profoundly altered the rhythms of life in the village. Daily routines are punctuated by thick smoke and a persistent chemical odour that seeps into homes and hangs in the air. This infrastructural intrusion introduced without consultation or warning , has resulted in what residents describe as a slow erosion of health, ecology, and dignity.

Methodological Framework

This study is grounded in a qualitative, interdisciplinary methodological framework, with fieldwork conducted in collaboration with local organisations, including the 'Associação Ambiental Amigos das Fortes,' in the Alentejo region of Portugal between December 2021 and July 2023. The research integrates several methods to construct a multi-layered counter-archive. Semi-structured interviews were conducted with residents to document situated knowledges of environmental harm and local activism. Visual and material documentation entailed the on-site collection of photographs, video, and contaminated surface samples. These samples were then processed using photogrammetry to translate ephemeral material traces into durable evidentiary objects for forensic analysis. This approach was supplemented by an analysis of public documents, including news media, legal filings, and materials circulated on community activist platforms.

This essay argues that contaminated surfaces in Fortes function as active archives–dynamic records of environmental injustice. This approach builds upon existing frameworks but offers a critical distinction. While Rob Nixon's 'slow violence' powerfully diagnoses the temporal challenge of representing attritional harm, this essay's focus on the surface offers a methodological response, providing a tangible way to record that violence as it unfolds in the present. In



FIGURE 1
Super-intensive olive monoculture in the Alentejo region. Photograph taken during a field trip in December 2021. Photo: Shengzhe Qu



FIGURE 2
View of the AZPO Migasa Olive Pomace Processing Factory in Fortes Novos, Alentejo, Portugal. Photograph taken during a field trip in December 2021. Photo: Shengzhe Qu

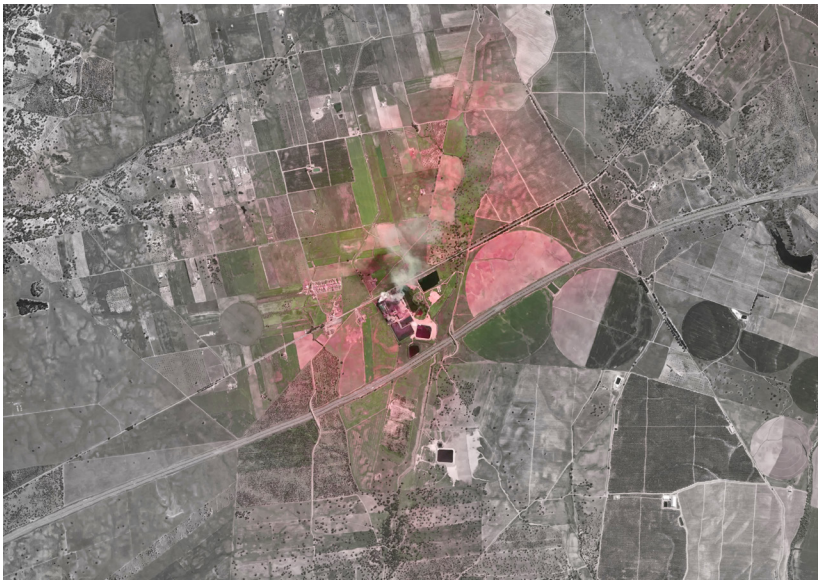


FIGURE 3
Satellite image of the AZPO Migasa Olive Pomace Processing Factory, with adjacent Fortes covered in smoke. Source: OpenStreetMap

contrast to the event-based focus of Eyal Weizman′s forensic architecture, this research analyses the accretive and ongoing nature of harm, where dust and residue form a continuous, living archive. Finally, where Anna Tsing examines contamination as a condition of precarious life, this work frames the surface as a site of civic action and counter-knowledge production, where residents actively document and resist through the material traces left behind.

Ethics Statement

Ethical considerations were central to this research. While the project was not subject to a formal institutional review, it was guided by established ethical principles for community-based research. All individual participants provided informed consent, and the decision to use real names rather than pseudonyms was made in collaboration with the residents, who expressed a strong desire for their testimony to be public and attributable as part of their political struggle for visibility. This decision was further supported by the fact that Rosa Dimas's case had already received significant local and national media coverage, establishing her as a public figure in this environmental conflict. All photographs and direct quotes are used with their express permission. Furthermore, this research draws on publicly shared materials from the community′s activist platforms, including the 'Problema Ambiental em Fortes' Facebook group and the local organisation 'Associação Ambiental Amigos das Fortes'. The use of this public testimony aligns with the community′s own stated goal of raising awareness and documenting their struggle. This overall approach seeks to honour the agency of the residents, positioning this research not as a study of a community, but as a platform developed with them to amplify their voices.

Politics of Particles

Despite Portugal's public commitment to environmental policy reforms—echoed by the European Union —situations like Fortes expose the dissonance between legislative intent and lived experience. The factory is not merely a site of production; it is a node of extractive contact, where bodies, surfaces, and infrastructures meet under unequal conditions. This form of environmental contact is not unique to Fortes. In Puchuncaví, Chile—long labelled a "sacrifice zone" —residents also live under conditions of sustained contamination. Like Fortes, Puchuncaví is a community where the political decision to host heavy industry has resulted in the long-term, state-sanctioned exposure of its population to toxic emissions. Tironi (2018) recounts how one woman wipes ash from her tomato plant each morning, despite knowing it will return the next day. The same cyclical encounter unfolds in Fortes, a choreography of wiping, inhaling, and adapting to toxic accumulation. The physical evidence of this is stark, as seen in the thick layer of grey dust coating fruit in a resident's garden, as depicted in Figure 4 and 5. As long as the factory operates, emissions circulate through the air, settle onto surfaces, and register across time and matter.

Here, the surface becomes a material index[1] of in-

1 The surface acts as an index here by providing a material trace of a wider network of actors—the factory, its chemical emissions, the

justice. As Edmond Locard (1930) famously argued, "dirt is matter out of place," while dust, he suggests, mirrors in miniature everything that surrounds it. (Locard & Edmond 1930. P, 276) In Fortes, airborne contaminants settle onto walls, windows, and roofs, forming sediments that silently record the violation of ecological and social boundaries. These are not just pollutants, they are residues of contact, embedding power, violence, and memory into the everyday environment.

The factory, as a downstream actor in Portugal's super-intensive agricultural economy, embodies a broader structure of extractive contact. Its operations produce emissions that combine labour, infrastructure, and land into new forms of toxic residue. As Schuppli (2012) observes, "dirt gets into things, defiling boundaries," while dust "submits objects to stasis." In Fortes, it is the political deadlock that allows the pollution to continue unabated and the emotional exhaustion that settles upon residents forced to adapt to a permanently altered landscape. This defiled boundaries are everywhere—marking the edges between private and public, visible and invisible, legal and lived. The contaminated surfaces thus function as what Schuppli terms material witnesses —not as a metaphor, but as literal evidentiary surfaces that are physical repositories of trauma, bearing harm rather than merely reflecting it. This lens allows us to read the village's environmental degradation not only as pollution, but as a forensic surface archive —a site where contact between industry and inhabitants becomes encoded in matter itself.

> "When the complex materiality of dust is exposed and finally returns to the field of image, it becomes political. From there, it has become a productive example of forensic aesthetics, renewing our vision, and letting us see the real face of the world - impure matter. (Schuppli, 2012)

Testimony

> "This is the view from my window. But I am disappointed with my countrymen, t hey almost never speak up in time to show everything that is in our soul. Am I starting to doubt myself?" (Testimony from Rosa Dimas).[2]

Rosa Dimas is a local resident of Fortes Novos, with her home located just 100 meters from the factory. Its presence is an inescapable part of her daily life, always within view from her window (Figure 6).

Situated testimony —producing a physical record of experience in the form of film or data— can, as writer and legal scholar Kinstler (2022) suggests, "realise its materiality." In this context, the individual portrait acquires significance not in isolation, but as a reflec-

wind, and the residents' bodies. Analysing such traces follows Bruno Latour's call to map the complex associations between human and non-human entities. See Bruno Latour, Reassembling the Social: An Introduction to Actor-Network-Theory (Oxford: Oxford University Press, 2005).

2 Rosa Dimas published this testimony on the community Facebook group Problema Ambiental em Fortes, a digital platform where local residents document daily emissions and environmental grievances. https://www.facebook.com/groups/problemaambientalfortes.

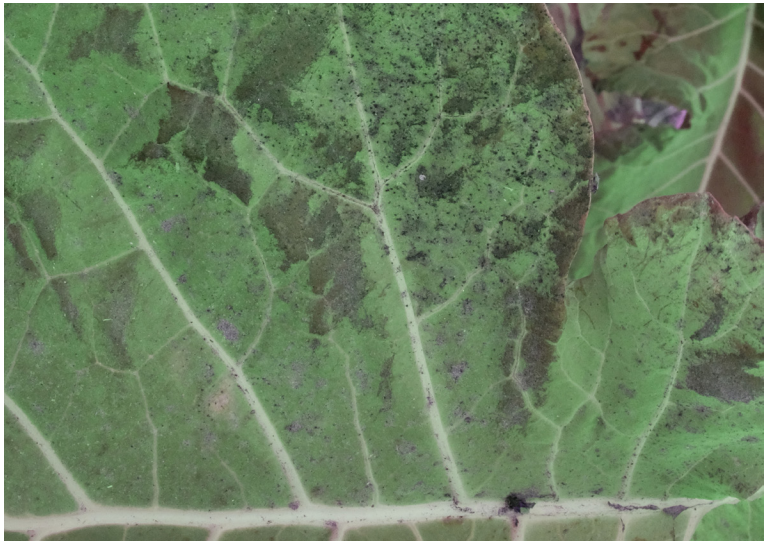


FIGURE 5
Contaminated surface sample from a local resident's outdoor garden in Fortes. Photograph taken during a field trip in July 2023. Photo: Shengzhe Qu



FIGURE 4
Fruit plant in Fortes covered by dust emissions from smoke. Photograph taken during a field trip in July 2023. Photo: Shengzhe Qu

tion of collective struggle. The accumulation of local testimonies, combined with spatial research, reveals resistance as both an affective and legal practice.

A particularly telling example is the ongoing legal case brought by Fortes resident Rosa Dimas against the olive pomace processing company AZPO Migasa. Her lawsuit[3] claims that the company is directly responsible for the emissions that have caused her personal health deterioration[4] , citing a range of specific symptoms from constant headaches and hoarseness to severe respiratory distress, including difficulty breathing and shortness of breath and environmental damage. In this case, resistance manifests through legal action, linking bodily harm to infrastructural violence. Dimas' legal battle underscores the high stakes of environmental testimony. Her experience—marked by prolonged exposure, health deterioration, and a decade-long fight for justice—reveals the personal toll of challenging environmental exploitation. Although she ultimately reached a settlement, the conditions of that agreement required silence[5] —a fact confirmed by news reports, though the specific terms remain confidential, a common outcome in corporate accountability cases. This silence functions as a form of epistemic violence (Spivak 1988): the legal process is used not only to compensate for harm but to erase the public testimony and situated knowledge of the person who suffered it. Her voice, however, lives on in the testimonies shared prior to litigation, continuing to circulate in public forums, social media, and local memory.

If the agreement between the plaintiff and the defendant is ratified, This will be the first time a company in the olive residue sector has compensated a citizen for pollution-related harm. This outcome reveals a critical tension in environmental resistance: while the settlement provided personal validation for Dimas, its confidentiality and lack of precedent simultaneously reinforce the very corporate and legal structures that enable 'slow violence' to persist. The legal system, in this case, provided a resolution for an individual victim but, in doing so, helped conceal the systemic nature of the harm, ultimately limiting the potential for collective justice. Yet it also raises broader questions: does such resistance translate into systemic transformation, or does it risk reinforcing

3 Regarding the legal proceedings, this source highlights a pivotal development in the lawsuit where the olive oil company publicly admitted to indemnifying the victim for pollution-related damages. This admission serves as a crucial validation of Dimas's claims, acknowledging corporate liability for the environmental and health deterioration she suffered. See: "Empresa de azeites admite indemnizar vítima da poluição," Jornal de Notícias. https://www.jn.pt/justica/empresa-de-azeites-admite-indemnizar-vitima-da-poluicao-15234213.html

4 The validity of these health claims was reinforced when the company publicly admitted to indemnifying the victim for pollution-related damages. See Jornal de Notícias. Empresa de azeites admite indemnizar vítima da poluição. https://www.jn.pt/justica/empresa-de-azeites-admite-indemnizar-vitima-da-poluicao-15234213.html

5 The confidentiality of the settlement is discussed in local news reports regarding the historic extra-judicial agreement. See Lidador Notícias. (9 October 2021). FA do Alentejo: Caso da poluição nas Fortes pode existir acordo extra-judicial histórico. https://lidadornoticias.pt/fa-do-alentejo-caso-da-poluicao-nas-fortes-pode-existir-acordo-extra-judicial-historico/

simplified narratives of harm? Kinstler (2022) notes that once a testimony enters the public domain, the witness's presence may recede—but their words, images, and traces remain, becoming part of a larger process of collective narration. In Fortes, Dimas' testimony functions both as legal evidence and as a catalyst for political awareness.

Media scholar Rob Nixon (2011) describes slow violence as "a violence of delayed destruction that is often difficult to represent." While Nixon powerfully diagnoses this challenge of representation, this essay offers a methodological response. The framework of surface extraction directly confronts this difficulty by treating contaminated surfaces as archives where slow violence becomes materially legible and recordable through a combination of forensic analysis and resident testimony. In Fortes, this form of violence settles on walls, bodies, and memories. Resistance—through litigation, film, protest, and oral history[6] —operates as a form of temporal contact and refusal, reclaiming the right to define how exposure is recorded and contested.

This resistance takes on new urgency when examined against evasive industrial tactics. The situation at the AZPO factory, where production intensifies at night, exemplifies the tactics used to evade environmental oversight. While government regulations have mandated a reduction in chimney use, emissions continue via smaller, concealed outlets[7] —such as the boiler system [8], which doubles as a covert exhaust. During the day, emissions are routed through the larger, more regulated chimney; at night, the factory switches to lower-profile methods, amplifying pollution under cover of darkness. This practice of tactical pollution requires a vigilant, on-the-ground monitoring effort from the community itself, turning their documentation into a crucial form of counter-regulation.

This nocturnal intensification exposes the limits of formal regulation and highlights the significance of community-led monitoring. Testimonies, video footage, and scenario reconstructions collected as part of this research uncover the invisibilised practices that contribute to Fortes' toxic landscape. The community is not only resisting visible pollution, but also the hidden, cumulative burdens of an extractive system that adapts itself to avoid detection. In this context, testimony operates as both evidence and refusal—recording what of-

6 Much of this collective resistance is organised and archived publicly on a community Facebook group Problema Ambiental em Fortes created to address the environmental problem in Fortes. The group serves as a hub where residents share video footage of emissions, photographs of residue, news about legal actions, and personal testimonies.

7 These outlets are described as 'concealed' because they act as secondary exhaust points—specifically the boiler system—that bypass the factory's primary filtration infrastructure. Unlike the main chimney, which is subject to strict monitoring, these smaller vents allow untreated emissions to be released with less regulatory oversight. Ferreira do Alentejo Municipality, "Sistema de Filtragem em Fase de Testes na AZPO," Ferreira do Alentejo, 9 January 2024 https://ferreiradoalentejo.pt/sistema-de-filtragem-de-em-fase-de-testes-na-azpo/.

8 This specific tactic is a recurring complaint from residents. On their community Facebook group, they have shared numerous photographs and videos as evidence, which appear to show significant emissions originating from the boiler system's secondary exhaust, not the main, regulated chimney. The community interprets this as a deliberate strategy to bypass the factory's filters, a claim documented in local news. See the community group 'Problema Ambiental em Fortes'



FIGURE 6
View of Rosa Dimas's home located 100 meters from the factory. Photograph taken during a field trip in August 2022. Photo: Shengzhe Qu

ficial structures attempt to conceal. Figure 7 and 8, which documents Rosa Dimas cleaning the contaminated surfaces outside her home. This endless cycle of accumulation led to a state of resignation, captured in her poignant testimony:

> "I've given up on cleaning outside... What do I see? I see a giant lion rising from that chimney, devouring the lives of those unfortunate enough to live beside it. I see indifference. Now it is Covid, but before it was something else—and these lives have never been a priority. I see people with little or no solidarity with environmental causes, yet quick to flock to trendy ones, like sheep following the shepherd's voice. I see a President turning a blind eye, comforted by the assurances of the powerful lobbies. I see a government that looks away, and a municipal chamber that winks its right eye at the public, and both eyes at the perpetrators. (Testimony from Rosa Dimas, collected during fieldwork in 2021.)

The encroachment of industrial pollution onto the traditional landscape is captured in Figure 9, where the hazy emissions from the factory visibly envelop the surrounding olive groves, turning the air itself into a surface of contact. Simultaneously, Figure 10 documents the factory's wastewater, a stark image of the liquid residues that contaminate the soil and water—further demonstrating the multiple surfaces on which this extractive contact is recorded.





FIGURE 7, 8
Rosa Dimas showing the surface outside her house that she has to clean regularly. Photograph taken during a field trip in December 2021.
Photo: Shengzhe Qu



FIGURE 9
Traditional olive trees surrounded by factory emission. Photograph taken during a field trip in July 2022. Photo: Shengzhe Qu



FIGURE 10
Wastewater emissions from the AZPO factory. Photograph taken during a field trip in December 2021. Photo: Shengzhe Qu

Surface Extraction

> We need, I believe, to engage in a different kind of violence, a violence that is neither spectacular nor instantaneous but rather incremental and accretive, its calamitous repercussions playing out across a range of temporal scales. In so doing, we also need to engage the representational, narrative, and strategic challenges posed by the relative invisibility of slow violence (Nixon, 2011: 2).

To meet the representational challenge that Nixon identifies, this essay analyses the surfaces in Fortes as an active archive, enabling us to unravel the political, ecological, and economic entanglements embedded within material environments. It functions not merely as a site of residue, but as a threshold between airborne particles from the AZPO Migasa factory and human bodies. When pollutants settle on surfaces and are interpreted alongside the testimonies of Fortes residents, they allow for nuanced reading of contact between human and non-human forces that are both methodologically and politically distinct. Methodologically, this approach is unique in that it layers forensic, material evidence with affective, human experience. Politically, it empowers the community by using physical proof to validate their claims of harm, creating a layered understanding of how industrial toxicity becomes ingrained within both matter and memory in the village.

Sekulić (2022) describes soil as an active archive, capable of revealing not only historical processes but also their continuing material aftermath. In Fortes, repressed experiences and environmental exploitation are etched into surfaces—rooftops, pavements, and fields—turning them into spatial embodiments of harm. These etchings are both material and social: they are the chemical residues from airborne emissions, and they are the traces of a political process that has dispossessed the community of its right to a healthy environment. As Schuppli (2012: 135) notes, "Dust may be formed of the debris of all kinds of bodies. The essential point, however, is the exact state or condition of the respective substances before they reached the status of pulverization. Understanding surface accumulation in Fortes requires this forensic lens: each particle records a moment of extraction, each layer sedimented with economic and ecological violence.

When we engage with the surface and its materiality to understand past events, we are inevitably drawn back to the ongoing struggle. This methodology is rooted in one fundamental idea: documentation as a form of intervention. The concept of investigative memorialisation challenges the notion of a singular, temporally bound event (Sekulić 2022). By treating contaminated surface samples as an active archive, combined with both human and non-human testimonies, we aim to reveal the hidden processes of extraction and exploitation. Through this approach, which includes interviews, film, and photogrammetry, we integrate multiple perspectives, ultimately constructing a comprehensive foundation for the research process.

Reframing the surface as a dynamic contact zone, this essay asks how material encounters between bodies and pollutants become legible, and how com-

munities resist the inertia of "slow violence" (Nixon 2011). In doing so, it reveals how surfaces —commonly overlooked— become entangled in the politics of exposure, memory, and refusal. Dust on the surface can be wiped away, but memories cannot. In regions affected by factory operations, the surface remains in an unstable and temporary state. This raises the question: How can we generate knowledge and insights that are relevant to both the present and future, particularly regarding the exploitation of local memory? How should we view the formation of commemorative activities—not as static events, but from the perspective of change and evolution?

As Pottage (1994: 373) argues, "Local memory came to be regarded as an unreliable and impracticable resource, and the technology of cartography became indispensable in the creation of a new foundation for contractual confidence." This shift points to broader mechanisms by which official narratives have displaced situated knowledges. In response, this essay explores how new memorial practices—grounded in environmental evidence, situated testimonies, and spatial archives—can reassert the authority of lived experience.

Documentation as intervention

Dust and residue are not just signs of decay. They are stories—of who passes through, what circulates, and what refuses to disappear. In Fortes, surfaces remember. Each layer of sediment carries traces of the struggle: the quiet refusal, the spoken testimony, the particles that do not leave. The surface becomes not just a boundary but a medium: between air and skin, memory and disappearance, harm and resistance.

What happens when the surface speaks back? When soot on a window or footage from a phone becomes a way to name what is happening? Surface Extraction begins in these details—tiles, stains, legal papers, the air outside a window—and draws them together into something shared. The everyday marks of harm become part of a larger archive: not static, but alive with tension, grief, and resilience.

Can the protracted struggle in Fortes be understood not merely as survival, but as resistance? For over a decade, the village has served as a spatial crucible where the forces of Alentejo's super-intensive agriculture come into direct contact with grassroots defiance. This ongoing interaction constructs not just opposition, but a form of civic identity—an emergent sense of environmental citizenship.

The question then arises: can such a model of resistance function as a framework for translocal solidarity, connecting geographically distinct yet politically resonant struggles for climate justice?

To interrogate these entanglements, I use a combination of visual and material methods—mapping smoke plumes, analysing particle composition, and employing photogrammetry to document surface transformations. These techniques are not merely technical; they are inherently political. As Calvillo (2018) argues, toxicity often operates through "distributed modes of contestation"—legal claims, media visibility, collective testimony. In Fortes, too, resistance unfolds through multiple registers: image, speech, sediment.

The approach seeks to uncover the political rela-

tions embedded in the technological production of air pollution, while supporting the community in developing a digital archival platform. This involves collecting interviews, testimonies, and documents that form part of a participatory counter-archive. Surface samples—often unstable and transient—are captured via photogrammetry to serve as both a record of spatial continuity and an interpretation of temporality.

The use of photogrammetry in this research offers a unique civic-forensic capability that human testimony alone cannot, a method that gains its power by processing community-generated video clips from the 'Problema Ambiental em Fortes' Facebook group. This technique is forensic because it performs a critical act of material translation. It converts community-generated visual data into a durable, objective, and measurable digital object (Figure 12). This 3D model allows for a precise analysis of the spatial topology, volume, and accretive nature of the particulate matter. It translates harm that was previously only sensory and qualitative into a quantifiable dataset. This translation from a subjective account into measurable, technical data is what actively resists the factory's evasive tactics. It speaks the language of regulatory and legal proof, giving the community's counter-archive a form of evidence that is much harder to ignore.

Local residents have formed a grassroots resistance network, using social media to document and share their experiences. The uploaded footage captures more than content; it embeds metadata—focal lengths, angles, camera positions—that contributes to a broader, situated record of struggle. The resulting 3D point cloud model functions as an expansive archive, revealing the extractive violence of olive pomace oil production alongside the community's ongoing resistance. Surface data, LIDAR scans, oral testimonies, found objects, and environmental soundscapes collectively produce an experimental method of preserving both landscape and memory.

This counter-archive process challenges "damage-centred" narratives by shifting focus to collective resilience and situated knowledge. It also explores new forms of political legibility. As Murphy (2017) warns, visibility often reinforces centre-periphery divides, but it remains a vital mode of intervention. In Fortes, documentation is not merely evidentiary, it is relational. It forges contact between bodies, institutions, and publics.

Anthropologist Arjun Appadurai (2006) described documentation as a "form of intervention," emphasising its role in archive-making, analysis, and dissemination. In contexts like Fortes, where state measurement infrastructures are absent, documentation becomes a counter-epistemology—asserting that knowledge production need not be monopolised by institutional authorities. Harun Farocki (2016) similarly argued for "self-determined" practices of research and archive-building that resist enclosure within expert silos.

The struggle and resistance extend beyond Fortes to encompass neighboring towns such as Alvito and Casa Alta, which also bear the burden of emissions from the pomace oil industry. The toxins do not respect administrative borders; they drift with wind, topography, and atmospheric conditions. Mapping exposure through proximity becomes a way to visualise this mobile and uneven field of harm.

The proposition of spatial practices involves as-



FIGURE 11
The photogrammetry workflow within the Agisoft Metashape software, illustrating the "civic-forensic" process. The main window displays the 3D model of a contaminated object, which was reconstructed from 1,200 cameras (frames). The "Photos" pane at the bottom shows the sequential images used as input data. The "Reference" pane on the left lists the calculated spatial coordinates (X, Y, Z) and camera angles for each frame, which, along with the camera's focal length, are used by the software to translate the 2D footage into a measurable 3D evidentiary object.
Image: Shengzhe Qu

sembling knowledge through documentation while simultaneously creating an intervention in both the existing and emerging public spheres—particularly in areas of Alentejo where such factories are being established. This also serves as a reminder for those who are settling in regions where the expansion of factory construction will occur due to the rise of intensive agriculture. A fundamental idea emerges here: "If we accept ethics as the domain of action in and on the world, then the very act of looking is also an act of intervening into the image-stream of the event as a kind of witness." (Schuppli 2012, p.140)

The counter-archive generated by the people of Fortes represents a spatial and ephemeral continuity. Its diversity in form, media, and audience allows the temporary, local memory to emerge from the surface and air particles, making it readable through different dimensions and platforms. In this way, the unstable and transient experience has evolved into a navigable, digitalised archival representation. This process not only draws awareness but also creates space for dialogue, bringing the knowledge to interpret these events into the public realm.



FIGURE 12
Photogrammetry model of contaminated olive branches, generated from footage shared in the Facebook group AAAF.
Image: Shengzhe Qu

> "Like this one, so are all the others. We can see clearly on the roofs, but not in our bodies... By the time you realise it is too late... How can no one have a minute and come to see what is going on.... They do not live here." (Testimony from Fortes resident).

Social movement

In Fortes, people breathe in what others profit from. They document, organise, retell. Testimony is passed hand to hand—spoken, filmed, mapped. These are not abstract gestures; they are forms of staying close to what matters. Through surface, the story does not just get told—it is carried, weathered, made public.

Practices that arise within everyday life may seem minor or disconnected at first glance. But as Nerea Calvillo (2018) suggests, when viewed together, these dispersed actions accumulate power—a form of resistance she calls the "politics of swarming." In Fortes and across the Alentejo region, small acts from residents speaking out online to workers resisting inside production chains, create a loose network of defiance. These acts may not directly alter the toxic environment, but they form a collective rhythm that challenges the conditions producing it.

Air pollution from the pomace factories reveals more than just environmental harm; it exposes a circular relationship between industry, community, and government—one marked by indirect contact, shifting responsibility, and delayed accountability. Within this loop, social movements and media function as connecting elements, linking people who may not share the same space or role, but who are affected by

the same extractive systems. In this way, resistance becomes a shared method of knowing and acting.

Appadurai (2006) argues that "all human beings are researchers," constantly navigating the unknown to make decisions. This framing reclaims everyday experience as a site of knowledge. In Fortes, residents document what the state refuses to measure—emissions, illness, sediment, and share these observations through digital platforms. These acts of collective self-documentation form the early infrastructure of a social movement.

> "Government, in this traditional sense of the word, is being superseded by what we call 'governance.' This refers to the way in which states 'steer' rather than command society, and where the market is allowed to play a full role in allocating resources." (Munck 2006, p.10).

As governance shifts from command to steering, power becomes more diffuse. This makes direct confrontation harder, and many people become resigned to the systems they inhabit. Paulo Freire (2020) notes that when individuals feel incapable of resisting, they often adapt to domination rather than risk fighting it. But resistance can also emerge from within these limits—from people who learn to speak, organise, and connect despite their structural constraints.

Arturo Escobar (1998) encourages us to rethink the role of social movements not only in protecting environments, but in questioning how those environments are defined and by whom. In Fortes, the surface—coated in dust—is more than pollution; it's a sign of how agricultural technology reshapes land, labour, and memory. Dust becomes both a symptom and a signal. As Wolford et al. (2013) argue, it is not enough to blame the state or capital in abstract terms.

Power moves through complex arrangements —legal, material, and spatial. Effective resistance must address these layers, not just their outcomes. In Fortes, which means building movements that are environmental, but also political and social —able to read the dust not only as harm but as a prompt to organise.

> "The development of environmental movements is not controlled by the state, but also different from the state... It raises the issue of the relationship between civil society and the environment." (Peet & Watts 2004, p.32).

Social movement, in the context of Fortes, is understood not as a static category but as a process—a method for linking bodies, spaces, and knowledge. Dust on the surface reflects the cost of technological progress but also connects people through shared exposure. In that way, it forms a material thread that runs across the region, tying together people, protests, and possibilities.

Traces on the Surface: Counter-Archives in a Measured World

> "We have the world inside out! The rulers of this world only do what is convenient for them." (Testimony from a resident of Fortes, July 2022.)

In Fortes, the smoke is visible. The smell is persistent. Dust clings to walls, to windows, to skin. Yet,



FIGURE 13
Olive Pomace Oil Processing Factory in Alentejo, Portugal. Photograph taken during a field trip in July 2022. Photo: Shengzhe Qu



FIGURE 14
Local residents of Fortes standing with the AZPO Migasa factory in the background in Alentejo, Portugal. Photograph taken during a field trip in December 2021. Photo: Shengzhe Qu

according to the official record, there is almost nothing. The nearest government air quality station [9]is located in Terena, far from the village and the emissions it absorbs daily. This spatial and technical gap is not incidentally reflects how environmental harm is allowed to persist where it is least likely to be measured.

Emissions data plays a powerful role in defining what counts as pollution. But it also defines what gets overlooked. When factories are sited in regions without proper monitoring infrastructure, their presence becomes speculative—both legally and atmospherically. In Fortes, this speculation is sharpened by the political reality: the AZPO Migasa factory, owned by a Spanish multinational, operates under conditions that would be illegal in its home country. Its placement in Alentejo reflects a broader willingness to overlook damage in the name of foreign investment and economic growth.

Quantifiable data, often treated as neutral, is itself shaped by these asymmetries. Drawing on Felix Guattari's (2005) critique of abyssal thinking—the separation of those with access to systems of representation and those without—we can understand how communities like Fortes are rendered peripheral not only geographically but epistemologically. They are left out of both measurement and decision-making.

This essay deliberately moves away from a data-centric approach. Not because measurement has no value, but because the terms under which it is gathered and used are already compromised. In Fortes, confirmation of harm does not require a sensor. The smell is overwhelming. The sediment is thick. These material cues, together with testimonies and acts of protest, offer a different form of environmental evidence—one rooted in the senses, in repetition, in place.

In Fortes, air and breath are inescapably political. Contact with pollution is not a momentary event but a persistent condition. It lingers on surfaces, inside bodies, and in the gaps left by regulatory silence. This essay aims to assemble not merely an archive of harm, but a counter-framework: a method of documenting exposure that resists abstraction. Here, both "archive" and "word" are employed not to simulate objectivity, but to trace instability, distortion, and residue. Dust becomes more than a pollutant; it transforms into a record. Surfaces bear both memory and resistance.

These practices challenge a legal and economic system that allows harm to continue as long as it remains unread. As Munck (2006) and Wolford et al. (2013) note, external investments—especially in rural regions—are often framed as development, even when they bring irreversible damage. Fortes becomes a case study in how this contradiction operates: environmental laws loosened, oversight diminished, and multinational actors protected by distance and legal ambiguity. But testimony persists. The residents of Fortes continue to record, to share, to speak. Their resistance—through legal cases, social media, and personal documentation does not rely on precision instruments. It draws instead on lived knowledge, shared perception, and the everyday labour of noticing.

9 Data regarding air quality monitoring is available via MeteoEstrela, specifically station number 8. https://www.meteoestrela.pt/qualidade-do-ar/

It is important to acknowledge the limitations of this study. The research is qualitative and focuses on a single case study, aiming for analytical depth rather than broad generalisability. It does not include quantitative chemical analysis of the particulate matter, focusing instead on the socio-political and experiential dimensions of contamination. Acknowledging these complexities opens up avenues for future research that could combine ethnographic methods with quantitative environmental science and political economy. What this essay argues is that such forms of knowledge matter. They are not secondary to scientific fact—they are a challenge to the structures that define fact in the first place. In Fortes, the surface becomes not just a place where pollution lands, but where a different kind of record can begin.

The counter-archive produced through 'surface extraction' is more than a record of harm; it is a tool for imagining post-extraction futures. Rather than simply demanding the factory's closure—a move with complex local economic consequences—this archive could ground community-led negotiations for remediation, co-designed air quality monitoring, or the establishment of a local environmental justice fund. It provides the evidentiary basis for a future where corporate operations are bound by the situated knowledge of the communities they impact.

Conclusion

Surface Extraction reveals how contact leaves its imprint—on bodies, buildings, and the very air itself. In Fortes, life under extraction is defined not by singular, dramatic events but by the slow accumulation of dust, the persistent breath in polluted air. This contact is never neutral; it is uneven, unwelcome, and often invisible. The surface holds these encounters, bearing witness to what has been done to the land and what continues to linger in the atmosphere.

There is no tidy ending. The contact persists. But does such resistance, the accumulation of these testimonies, translate into systemic transformation, or does it risk reinforcing simplified narratives of harm? Is it possible for these traces to catalyse the kind of deep, structural change that Fortes so desperately needs, or will they remain just another layer of sediment in a system that continues to profit from the same violence? The surface remains—marked, unsettled, and enduring. And yet, by naming what the surface holds and making space for what lingers after contact, something shifts. What was once ignored becomes visible. What was endured in silence becomes a call to be heard. This forensic surface archive is not just a record of harm but also a challenge to what can be forgotten.

This framework of 'surface extraction' offers more than a method for documentation; it is a tool for political action. By making invisible forms of harm legible, it empowers communities to build their own counter-archives, challenge regulatory silence, and assert their right to a healthy environment. The surface, in the end, is not just a site of contact—it is a site of contestation.

§

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Figure References

Figure 1: Qu, S. (n.d.). [Cover/Title Image]. Personal Collection.

Figure 2: Qu, S. (2021). View of the AZPO Migasa Olive Pomace Processing Factory in Fortes Novos, Alentejo, Portugal [Photograph]. Photograph taken during a field trip in December 2021.

Figure 3: Satellite image of the AZPO Migasa Olive Pomace Processing Factory, with adjacent Fortes covered in smoke [Satellite Image]. Source: OpenStreetMap.

Figure 4: Qu, S. (2023). Fruit plant in Fortes covered by dust emissions from smoke [Photograph]. Photograph taken during a field trip in July 2023.

Figure 5: Qu, S. (2023). Contaminated surface sample from a local resident's outdoor garden in Fortes [Photograph]. Photograph taken during a field trip in July 2023.

Figure 6: Qu, S. (n.d.). Rosa Dimas's home located 100 meters from the factory, view from her window [Photograph]. Personal Collection.

Figures 7–8: Qu, S. (n.d.). Rosa Dimas cleaning the contaminated surfaces outside her home [Photographs]. Personal Collection.

Figure 9: Qu, S. (n.d.). Hazy emissions from the factory enveloping the surrounding olive groves [Photograph]. Personal Collection.

Figure 10: Qu, S. (n.d.). Factory wastewater contaminating soil and water [Photograph]. Personal Collection.

Figure 11: Qu, S. (n.d.) The photogrammetry workflow within the Agisoft Metashape software, illustrating the ″civic-forensic″ process. The main window displays the 3D model of a contaminated object, which was reconstructed from 1,200 cameras (frames). The ″Photos″ pane at the bottom shows the sequential images used as input data. The ″Reference″ pane on the left lists the calculated spatial coordinates (X, Y, Z) and camera angles for each frame, which, along with the camera′s focal length, are used by the software to translate the 2D footage into a measurable 3D evidentiary object.

Figure 12: Qu, S. (n.d.). 3D photogrammetry model from community-generated video clips from the 'Problema Ambiental em Fortes' Facebook group [Digital Model]. Personal Collection.

Figures 13: Olive Pomace Oil Processing Factory

in Alentejo, Portugal. Photograph taken during a field trip in July 2022.

Figure14: Local residents of Fortes standing with the AZPO Migasa factory in the background in Alentejo, Portugal. Photograph taken during a field trip in December 2021.