



HAL
open science

Unwanted Legacy and Memory of the Milieu: Toxic Materials, Remediation, Habituation (Estarreja, Portugal)

Fabienne Wateau, Carmem Regina Giongo, Daniela Figueiredo, Johnny Reis, Manuelle Lago

► To cite this version:

Fabienne Wateau, Carmem Regina Giongo, Daniela Figueiredo, Johnny Reis, Manuelle Lago. Unwanted Legacy and Memory of the Milieu: Toxic Materials, Remediation, Habituation (Estarreja, Portugal). Elizabeth Kryder-Reid; Sarah May. Toxic Heritage. Legacies, Futures, and Environmental Injustice, Routledge, pp.188-201, 2023, 978-1-032-42999-1. 10.4324/9781003365259-21 . halshs-04238061

HAL Id: halshs-04238061

<https://shs.hal.science/halshs-04238061v1>

Submitted on 11 Oct 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

11

UNWANTED LEGACY AND MEMORY OF THE MILIEU: TOXIC MATERIALS, REMEDIATION, HABITUATION (ESTARREJA, PORTUGAL)

Fabienne Wateau, Carmem Regina Giongo, Daniela Figueiredo, Johnny Reis, and Manuelle Lago

Introduction – Damaged World

Between Land and Water, the Place is Magnificent

On the Portuguese Atlantic coast, south of Porto, a large lagoon of brackish water has been designated as a Special Protection Area (SPA) by the Natura 2000 network (Natura 2000). It offers a rich habitat favourable to the reproduction of a large number of migratory birds; the landscape has become very popular for birdwatchers and tourists because of the layout of its promontories, pastoral paths, and cyclable bridges. Between land and water, the place is magnificent. Nature is as if preserved there, some of it wild, totally unspoiled by contamination.

And it is this particularly positive image that local politicians and institutions go to great lengths to defend and protect. On the periphery of Estarreja city, which has been home to an industrial chemical facility since the 1950s and also has its feet in the water of this lagoon, one area in particular – which is called BioRia today, and was once a spillway for toxic products from the facility's factories – won the 2008 prize for best environmental rehabilitation and biodiversity preservation on the Ria de Aveiro. BioRia is the new calling card brandished by the city council, in association with PACOPAR, a multi-actor consortium organised around the factories, which itself also won a prize from the 2005 European Responsible Care Awards.¹ It is therefore between Aveiro and Estarreja that this study is geographically situated; and it is between toxic materials, remediation and habituation that it takes its sociological context.² In response to this book's theoretical argument, which encourages us to question the idea of toxicity as heritage, the article will begin by reviewing some of the anthropological literature on recovery, then consider the proposed concept of toxic heritage, and finally, present the chosen case study in connection with memory and heritage.



FIGURE 11.1 The BioRia, biodiverse wetland. Photograph by Manuelle Lago 2016.

Among Optimism and Utopia

Rehabilitating, restoring, and remedying. Because we didn't manage to prevent, contain, or protect. Rachel Carson's book *Silent Spring* certainly attempted to alert populations and decision-makers when she asserted that 'along with the possibility of the extinction of mankind by nuclear war, the central problem of our age has therefore become the contamination of man's total environment with such substances of incredible potential for harm – substances that accumulate [...]'. (Carson 2002, 7). In addition to this 'obligation to endure', it seems that we have subsequently been imposed the obligation of 'staying with the trouble'. Donna Haraway (2016), Ana Tsing (2015) and Bruno Latour (2017, 2021) – to name a few – are part of this optimistic, benevolent trend of raising awareness about a better world, advocating possible forms of earth resurgence (Terra/Gaïa): 'The task is to become capable, with each other [...], of response. Staying with the trouble does not require such a relationship to times called the future. Staying with the trouble requires learning to be truly present, not as a vanishing pivot between awful or edenic pasts and apocalyptic or salvific futures [...]'. She sets out another model, of 'oddkin [...] unexpected collaborations and combinations [...] We become—with each other or not at all [...] Sympoiesis—making-with' is the way to go. Haraway's complex theoretical book abounds in ideas and interpretations. It also outlines

concrete actions, at local and regional levels that are situated, ‘partial’, that is to say, contextualised – as proof of the possible actions of ‘art/science activisms [...]’ aimed at ‘multispecies resurgence [...] a recuperation [...]’ that would be part of response through our abilities, ‘response-abilities’ (Haraway 2016, 1; 5; 16). In Latour’s view, faced with the ‘reaction of the earth system’ that began after the 70 post-war years that specialists called the ‘Great Acceleration’ (Latour 2017, 76), ‘we need to reinvent everything all over again – the law, politics, the arts, architecture, cities. But – and this is stranger still – we also need even to reinvent movement, the vector of our actions. We need not forge ahead into the infinite, but learn to step back, to unplug, in the face of the finite. [...]’. It is a quite clear political position, where the ‘violence of the power struggle between the Extractors’ (over-exploiters of the earth’s resources) ‘and the Menders’ (the ‘terrestrials’ or repairers) is at play (Latour 2021, 155–157). So of course, if ‘recuperation is still possible, but only in multispecies alliance, across the killing divisions of nature, culture, and technology and of organism, language, and machine’ (Haraway 2016, 118), then it is nevertheless very difficult to go from philosophy to the field, and especially to find among our interlocutors in civil society the forces and means to concretely take up these challenges of ‘assemblages’ (Tsing 2015) that almost smack of utopia.

The Pessimistic View

Soraya Boudia and Nathalie Jas’s vision is much more pessimistic (2019). After having sketched the history of the governance of the toxic world, which they divide into three forms (governance through control, governance through risk, and governance through adaptation), they rather condemn this policy of rehabilitation, maximum adaptability, and resilience. Because ‘it is no longer a matter of rehabilitating damaged sites—something that has hardly ever been done satisfactorily—but rather to rehabilitate life possibilities on permanently contaminated lands’. And it is the ‘populations living on contaminated lands [that] must learn to show resilience, to reinvent themselves and move forward despite the problems they face’. This government of adaptation ‘contributes to normalising, or more precisely “naturalising”, not only serious accidents but also ongoing contaminations that are often less immediately perceptible. This naturalisation process makes it possible not to single out those responsible for pollution bringing about visible and less visible catastrophes, and not to determine the deep causes of these’. The axe abruptly falls on this ‘staying with’ policy. Because by ‘overemphasising the adaptability of individuals and populations [...] these policies are not devoid of cynicism’ (Boudia and Jas 2019, 89–92). The portrait they sketch of the situation is therefore rather sombre, as they explain: ‘Sombre because of the scale of the environmental pollutions described by many scientific texts [...]; Sombre also because of the cynicism of certain actors who try to ignore or cover up the damaging effects of their activities. Sombre finally because of the inability of various committed mobilisations and implemented regulations to curb this movement over the long term’ (Boudia

and Jas 2019, 95). In her quite chilling book, Lucie Taïeb (2020) tells the story of the human remains of the attack on the Twin Towers, mixed with garbage at the former Staten Island dump, which is in the process of becoming a large public park with recreational space for children. She describes her guided tour of the site, where the process of confining and capping the dump, through successive layers of materials possessing specific properties, is described to visitors. Depressed, Taïeb adds: ‘Now everything is repaired, and this is the only consolation for all of the evil we know. The wounded earth is infinitely resilient, and memory is plastic. Shame and blemishes are erased. [...] Everything is repaired and everything is erased; yet nothing disappears’³ (Taïeb 2020, 76).

Unwanted Legacy in Estarreja

A Logical Continuum of Heritage Studies

Since it has been recognized that ‘heritage comes also in diverse ‘negative’ forms, such as environmental pollution, social inequalities, and poverty, inherited from the past and having a myriad of impacts in the present,’ other definitions of heritage have been included in ‘a logical continuum [...] of this subfield of heritage studies’ (Thomas et al. 2019). Wollentz et al., in 2020, first proposed a definition of toxic heritage: ‘we use the term “toxic heritage” to describe instances in which forms of difficult heritage come to endanger certain core values in society (such as equal rights and opportunities, peaceful coexistence, freedom of speech, health, and well-being), most often because of a lack of responsible management’ (Wollentz et al. 2020, 299). In this book, Kryder-Reid and May (2024) are using the term toxic heritage to refer to the materiality of toxic substances, focusing on literal meanings; and connecting that history of harm with both formal heritage institutions and informal memory practices. Can toxic material be heritage? What does framing toxic sites as heritage offer? How are toxic sites remembered or, conversely, erased in the memory practices of communities and in official heritage narratives such as museums and historic markers? Are some of the questions asked in this volume (Kryder-Reid and May 2024).

Toxic Materials

Estarreja⁴ falls within the definition of toxic heritage explored in this collection (Kryder-Reid and May, 2023) and also partly in the other framework (Wollentz et al. 2020). A chemical facility has existed there since the 1950s, one that discharged tons of toxic chemical products into the environment (earth, water, air) without oversight until the 1990s. Among the toxic materials found there, ‘the most common pollutants are sulphur oxides and nitrogen oxides, ammonia, mononitrobenzene, suspended solids and vestiges of heavy metals, particularly arsenic and mercury. Liquid effluents include aniline, ammonium, benzene, mononitrobenzene, arsenic, iron, zinc and lead. In general, the liquid effluents originating from the chemical facility’s factories (whether or not they



FIGURE 11.2 A well for irrigation next to the factories. Photograph by Carmem Giongo 2019.

have undergone pre-treatment) end up in two ditches (those of São Filipe and Breja) leading to their final destination (the *Esteiro de Estarreja* [...])' (Barrosa 1985 quoted by Azevedo 1999). The superficial and groundwater are contaminated and will remain so, apparently due to a lack of possible treatments and their costs. But this water is still used to irrigate maize (and adjacent plants like gourds and beans in backyard gardens), being easily accessible through pumping from wells.⁵ In response to our questions, the city health department asked us to systematically remind inhabitants not to drink the well water – implicitly revealing a habit acquired by some people.

Danger to human (and animal) health, therefore, seems real and existent – yet research into miscarriages, for example, has not succeeded in proving a higher incidence in *Estarreja* than elsewhere (Valente 2016).

The Materiality of Toxic Substances

From the institutions, there exists a certain kind of silenced information and a choice about which type of past to promote. On the developed bank of the *Esteiro de Estarreja*, whose underwater sludge has been proven to be contaminated with arsenic and mercury, a sign recalls the history of salt shipping by boat from the sea to the city. It provides information about the lagoon's pre-1950s social and trade history. But nothing is said about the toxic sediments it has retained, which were discharged by factories after the 1950s and are still dangerous; nor about the ban on swimming there. This lack of warning signs, which shocked us in 2016, was viewed

by some members of the team as deliberate concealment from tourists, who are very numerous in this region. This was also observed near the *Largo do Laranjo*, another area heavily polluted by mercury, where the banks have been attractively developed into cyclable paths, without any signs warning about the dangerousness of the sludges in the deep water. But according to the biology teachers at the high school in Estarreja, it seems that a lack of information is notorious in that area, where (illegal) shellfish divers take risks that pose a threat not just to themselves, but also to the environment, by digging up sludge full of heavy metals. The town council prefers to emphasise a rich history of salt and of algae harvesting (*moliço*) instead of stressing the more recent unwanted legacy, which is damaging to its image.⁶ All the more so since it actively intervenes to repair the environment. It also seems that the contamination of the environment is a legacy that can cross generations, regardless of the attitude of the population and their point of view on this contamination. The unwanted legacy seems accepted, with resilience (Boudia and Jas 2019).

Remediation and Memory of the Milieu

Legacy versus Heritage

Actually, in Estarreja, the fieldwork did not lead us to heritage or toxic heritage but remediation. Through sponsored interventions at different scales from local to international, the physical and environmental recovery of contaminated spaces is ongoing. In the past, this has already been applied to two solid waste dumps. In the older one (*Parque de Lamas*), mercury sludge dumped on permeable sands has been covered over, using only lime. This space remains open and easily accessible to the public. Motocross bike tracks are visible on it. The other one (*Aterro de Cinzas brancas*) retains other toxic sludges under a waterproof plastic film. Covered in the soil, it forms a sloping hill surrounded by a fence, access to which is prohibited or restricted. Both are adjacent to the factories, far from the flagship remediation operation on a former liquid waste spillway, a wetland that is today called BioRia. Through phytoremediation – controlled cooperation between species, the basic rule of ‘making-with’ (Haraway 2016) – and *Phragmites australis*, a plant that is already abundant in that lagoon, the lands caught in the roots are gradually being decontaminated. A refuge for birds and hikers with its wild and/or cultivated lands interspersed with water channels, some of which are navigable, the BioRia is today the pride of the city council and people of Estarreja, a *natural heritage*⁷ whose interpretation centre and mascot have been set up as symbols of clean, sustainable renewal. The interpretation centre stresses biodiversity and suggested walks. No link is made with the area’s industrial history.

Recovery of a Contaminated Ditch

The last regeneration programme concerns the removal of contaminated soil from one of the drainage ditches, carried out in 2021. This ditch (*Vala de São Filipe*)



FIGURE 11.3 BioRia mascot. Photograph by Fabienne Wateau 2016.

crosses woodland, land cultivated with maize, and a hamlet. Its course ends in the Esteiro de Estarreja, which itself belongs to the water network of the whole of the Ria de Aveiro. In 100 days the ditch was cleaned out; its soil was removed to a depth of 40 cm and transported by truck to a decontamination centre near Lisbon; then a geotextile fabric and heavy rocks were placed on the bottom. Contaminated soil was also removed from the verges, up to a width of 5 metres, and arable replacement soil was added for cultivated fields. The ditch is now paved, and this is supposed to prevent all possible contact with pollution, especially for the people who had the routine of scrubbing it after winter. It will prevent neither the grasses from growing there again nor the still-contaminated groundwater from overflowing during heavy rain. But it contains and represents the space, it warns through its restoration, it informs, it protects.

A Border Case

On the area's memory, traces and a few scars, therefore, remain: old abandoned factories; still contaminated groundwater; an unmissable white mountain of lime; a sloping hill almost forgotten; a crossing line that will fade into the vegetation over time; a mended and maintained walking space set up as natural heritage. Underneath or inside, the materials remain (Storm 2014). The toxic sites of Estarreja are neither remembered nor erased. Belonging to the landscape, they are gradually decontaminated or confined.



FIGURE 11.4 Paving of the ditch in the hamlet. Photograph by Fabienne Wateau 2021.

As things stand, they are not subject to any interpretation, or any reflexivity on history, nor do they serve as strategies of resistance or restorative justice. Estarreja appears as a border case, a situation where the question of toxic heritage is not yet asked by the institutions. Only a natural heritage is praised and protected.

Habituation and Activatable Memory

The City's Image

The reconstruction of Estarreja is also societal. In 2001, the PACOPAR was created, a multi-actor consortium grouping the five active chemical factories (Air Liquide, AQP, Cires, Bondalti and Dow), to establish connections with the main entities of civil society, including the city council, the firemen, the health centre, the schools, the University of Aveiro, and the ecological Cegonha association. This institutional and political coming-together supports the factories' desire for transparency and goodwill, and its members' common aim of applying Responsible Care principles, for a 'sustainable development of Estarreja and the world, by linking economic development with the protection of the environment and health' (CME 2010). In a sense, the PACOPAR is trying out a societal and environmental *making-with*, and it was awarded a prize for this in 2005. During its regular meetings, it also distributes grants for the city's educational and cultural activities, as well as for

environmental research. It is in this context of physical and political reconstruction that Estarreja is managing the present time of its still-active chemical facility. And this might be the reason why, unlike other industrial cities, Estarreja does not seem prone to turn its factories into a potential social or cultural heritage that can be valorised, nor to repurpose some of them (Berger 2019). Having a cinema/theatre, a library, several museums, a jazz festival and an urban art festival, its rich artistic-cultural program somewhat systematically bypasses any reference to the factories. There is no mural painting representing the industrial part of the city, nor any existing book about the history of the chemical facility. The unwanted legacy is not a source of pride. It remains a heavy burden. Its valorisation is not on the agenda. Neither is its patrimonialisation. In the booklet for the 2020 ESTAU Urban Art Festival, Estarreja is presented as the hometown of Egas Moniz (1949 Nobel Prize in Medicine) and as a unique biodiversity zone with the BioRia.⁸

The Worrying Comes from Others

On the other hand, the neighbouring University of Aveiro just 20 kilometres away has an obvious interest in the chemical facility. Since its creation in 1973, much research has been conducted at Estarreja, and academic theses and publications in biology, geoscience, toxicology and other fields abound. Since 2010, an Observatoire Hommes-Milieux receiving funding from France (Labex Driihm-CNRS-INE) has been reinforcing this research laboratory. Yet, very few of the results get back to the local population – the requirement that academics write in English being one of the reasons. A book *The Factory and the Life* should soon be published in Portuguese. This collection of interviews with former workers of the chemical facility shows that a social and rather kindly memory is accessible and activatable.⁹ The film we created (Giongo and Wateau 2021) also features workers with fairly happy memories associated with economic prosperity and pride in not having been obliged to emigrate or live in agriculture. The relationship with the dangers is more complex. Unsurprisingly, however, the worrying comes from others: the closer one stands to the epicentre, the less one's awareness of danger is activated – or activatable (Beck 1999). Without any denial of the existence or futile resistance, there is something like necessary habituation to an evil accepted as necessary. The film also presents the citizen science project CITAQUA¹⁰, which, by linking the university, the locals and the schools, succeeded in raising awareness, as well as teaching (particularly adolescents) about other contamination sources in the water of private wells, with a focus on nitrate levels. The monitoring of 27 wells by their owners using measurement kits distributed by this academic project made some users realise that they could no longer use well water for domestic purposes. Awareness among citizens of the groundwater quality and its vulnerability was increased. The fact that political decision-makers could now seize upon that successful action to distribute kits to well owners would magnify that principle of *making-with*, and also ensures prevention and information, quite obviously. Schoolchildren also



FIGURE 11.5 Air quality awareness-raising with school children. Photograph by Fabienne Wateau 2019.

benefit from a few air quality awareness-raising sessions, in which they are asked fun questions for example.

At the same time, thanks to university funding, extra air-measurement sensors have been installed, able to supply tangible indicators for research.¹¹ It is not yet a matter of scientific-artistic activism, like *Pigeon Blog*, which involves civil society, artists, and pigeons equipped with air quality sensors that can take readings on the ground and at various heights in the sky (Haraway 2016, 37), but maybe it should get to that point someday.

A Kind of Balance

Because although actions are being carried out with a civil society receptive to awareness-raising programmes, these people prove to be more resistant to the possibility of self-organising to create an opposition force, or simply a monitoring force. Estarreja's only ecological association, created in the 1990s to (successfully) fight the government's decision to locate a very polluting waste incinerator in Estarreja has almost no members today. Therefore, whether sufficiently informed or not, the population seems as if it is 'staying with' the chemical facility. There is no silenced memory, nor any memory or recollections activated by the municipality (at the risk of losing them) with a view to possible patrimonialisation. No one seems to

have taken possession of a certain history, neither the city council, nor the factories, nor civil society, nor even a historian. Therefore, it seems that some kind of balance has been established in Estarreja, through habituation that takes comfort in turning around the city's image through concrete environmental regeneration actions, and through the energy invested in sociocultural activities that make the city attractive and pleasant to live in. A *rotten peace*?¹² Maybe. But between acceptance of a toxic heritage that – in a certain way – attributes an active recognition to pollution, and the gradual recovery of an unwanted legacy of which no one wants to be the standard-bearer, the choice seems to have been made.

Conclusion

Estarreja is neither *Flammable* in Argentina (Auyero and Swistun 2009) nor even Lubrizol in France (Izoard 2020). Fortunately, no serious accident occurred at this location. Estarreja is only one case among many others where, after the euphoria of full employment thanks to factories, the damage to the environment and health now has to be repaired. Estarreja is also not in a post-industrial context, where a form of nostalgia for the past could unfold (Storm 2014; Berger 2019). Quite the contrary. In August 2022, one of the complex's powerful entrepreneurs announced in the press that the contract between the chemical plants had just been renewed for 15 years because their competitiveness in hydrogen production technologies was ensured (*Expresso*, 19/08/2022). Industrialists, city councils and people continue to rely on the chemical and industrial complex for the future, in terms of dynamic economic production and jobs.¹³ What is perceived today in Estarreja is a toxic legacy, which leads to environmental repair operations. What is not formalized is the existence of a toxic heritage, which from the past to the future is irreversibly inscribed in this place: no local historian, citizen association or municipal actions seems (yet?) to think of the place in terms of memory or heritage. The case of Estarreja shows that material toxicity is not synonymous with negative associations and that 'habituation' can be useful in thinking about how toxic heritage intersects memory practices. Unfortunately, conceptualising toxicity as heritage does not tend to resolve real problems, like spatiotemporal, political and institutional differences. While on the one hand, there is recovery, generally in advanced economies, on the other hand, there is our own recovered and ever-accumulating waste (toxic materials, technology, clothing ...) in emerging countries, sent there by land, air and sea – that social and environmental injustice that is much evoked, but that we are only maintaining and reinforcing. While discourse here is in favour of green environmental protection technologies, over there, where others live, discourse concerns the 'extremely polluting extraction of those many metals that those green technologies need for their production, carried out under conditions that are catastrophic for workers and residents living near the production sites, and will soon end up as waste for which we have no solution available – nor is any being studied' (Boudia and Jas 2019, 96). There are also gaps between the university and the

insufficient return of research to locals; between philosophical thought and actors in the field. Our contribution appears here as a border case for this volume devoted to Toxic Heritage and Heritage Studies. It responds more directly to research on repair and species alliances – as suggested in the introduction. With success, BioRia has become that dynamic environmental and ecological *patch* evoked by Tsing (2015). Are we ‘capable, with each other in all of our bumptious kinds, of response?’ (Haraway 2016, 1). Let us hope that operations to minimize damage to health and the environment continue; that no chemical accident ever occurs; and that one day, perhaps, once all chemical and industrial activities have ceased, a human memory – not just a memory of the milieu – is developed there.

Notes

- 1 Respectively: Regional Prize in the ‘Environment’ category of the first edition of the Annual Tourism Prizes, awarded by Turismo da Rota da Luz; ‘For the example of innovation, transparency and success in relations between the chemical industry and the community’ (CME 2010).
- 2 This ongoing research has benefited from several sources of financing: from the Labex Driihm (Dispositif de Recherche Interdisciplinaire sur les Interactions Hommes Milieux) CNRS-INE, in 2016 and 2019; from the Labex PP (les Passés dans le présent) CNRS-INSHS in 2020; from the MSH-Mondes (for the film SAFE) in 2019; from SMI (Soutien à la mobilité internationale) of the INSHS CNRS in 2021. It has been conducted collectively by all of the co-authors, under the supervision of the first author of the article. The team unites several fields: social anthropology, psychology, geography, biology and environmental engineering.
- 3 On the positive role of forgetting see this volume (May 2024).
- 4 A mixed territory with 27,000 inhabitants, including the chemical facility, an urban centre, hamlets, and rural areas with breeding, horticulture, and cereal farming.
- 5 Research conducted by the University of Aveiro proved that mercury was retained in the maize roots but did not get into the grain. On the other hand, nothing has been confirmed about the associated plants (Cabral-Pinto et al. 2020).
- 6 However, very high financial damages that are not without importance in many ways are repaid by the factories. In fact, every industrial site pays compensation to the municipalities. We do not yet have these figures for Estarreja.
- 7 Title of the book published by the city council of Estarreja (CME 2010).
- 8 See also Silva (2015).
- 9 Elisabeth Figueiredo (Dir.), Labex Driihm 2015. See Figueiredo (2018).
- 10 Daniela Figueiredo (Dir.), Labex Driihm 2015. See the first results in De Figueiredo et al. (2017).
- 11 Myriam Lopes (Dir.), Labex Driihm 2018. See the first results in Reis et al. (2020).
- 12 Criticism made by PACOPAR through one of the people interviewed in 2016. See the verbatim statement in Wateau (2018).
- 13 It would be 3,000 direct and indirect jobs (*Expresso*. August 19, 2022). De Mello.

References

- Auyero, Javier, and Débora Alejandra Swistun. 2009. *Flammable: Environmental Suffering in an Argentine Shantytown*. Oxford University Press.
- Azevedo, Maria Celeste. 1999. “Contribuição para a caracterização ambiental da área envolvente do complexo químico de Estarreja.” University of Aveiro. Master thesis.

- Beck, Ulrich. 1999. *World Risk Society*. Cambridge: Polity Press.
- Berger, Stefan. 2019. "Industrial Heritage and the Ambiguities of Nostalgia for an Industrial Past in the Ruhr Valley, Germany." *Labor. Studies in Working-Class History* 16 (1): 37–63.
- Boudia, Soraya, and Nathalie Jas. 2019. *Gouverner Un Monde Toxique*. Versailles: Éditions Quae.
- Cabral-Pinto, Marina, Manuela Inácio, Orquídia Neves, Agostinho Almeida, Edgar Pinto, Bárbara Oliveiros, and Eduardo Ferreira da Silva. 2020. "Human Health Risk Assessment Due to Agricultural Activities and Crop Consumption in the Surroundings of an Industrial Area." *Exposure and Health* 12 (4): 629–640. 10.1007/s12403-019-00323-x
- Carson, Rachel. 2002. *Silent Spring* 40th ed. Boston: Mariner Books.
- CME - Câmara Municipal De Estarreja. 2010. *Estarreja, Património Natural*. Estarreja: BioRia.
- De Mello, João. 2022. "Somos quem mais sabe de tecnologia de produção de hidrogénio em Portugal." *Expresso*. August 19, 2022.
- de Figueiredo, Daniela, Pedro Marquinhos, and Luís Gonçalves. 2017. "Groundwater Quality Monitoring by Local Citizens at a Small Town." In *Book of Abstracts of the SciCom PT 2017 - Congresso de Comunicação Em Ciência, 12–13 October*. Coimbra, Portugal.
- Figueiredo, Elisabete. 2018. "Não Queriam Que Ninguém Soubesse Que Era Uma Fábrica Perigosa» – Narrativas Dos Trabalhadores Do Complexo Químico de Estarreja Sobre Os Riscos No Trabalho e a Sua Evolução." In *Ambiente e Direitos Humanos*, 709–721. Aveiro: Universidade de Aveiro.
- Giongo, Carmem, and Fabienne Wateau. 2021. *SAFE – Social Awareness for Environment in Estarreja*. Documentary, 24m. Paris, France: Iiac-Cnrs audiovisual department (Labex Driihm/Msh Mondes). 10.34972/driihm-a125h8
- Haraway, Donna. 2016. *Staying with the Trouble. Making Kin in Chthulucene*, Durham and London. Durham: Duke University Press.
- Izoard Celia. 2020. "L'effet Lubrizol". "Rouen - Fumées Noires et Gilets Jaunes." *Z - Revue Itinérante d'enquête et de Critique Sociale* 13: 18–25.
- Kryder-Reid, Elizabeth, and Sarah May, co-editors. 2024. *Toxic Heritage: Legacies, Futures, and Environmental Injustice*. London: Routledge.
- Latour Bruno. 2021. *Où suis-je? Leçons du confinement à l'usage des terrestres*. Paris: La Découverte.
- Latour, Bruno. 2017. *Où Atterrir? Comment s'orienter en politique*. Paris: La Découverte.
- Natura. 2000. Network website: <https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=PTCON0061>
- Reis, Johnny, Carlos Ribeiro, Daniel Rodrigues, and André Rodrigues. 2020. "Accident Scenario Modelling with Hazardous Materials in Transportation Infrastructures." *Proceedings of the Institution of Civil Engineers in Forensic Engineering* 172 (4): 133–149. 10.1680/jfoen.20.00015
- Silva, Adriana. 2015. "O BioRia e a Construção da Imagem de Estarreja." University of Aveiro. Master thesis.
- Storm, Anna. 2014. *Post-Industrial Landscape Scars*. New York: Palgrave MacMillan.
- Taiëb, Lucie. 2020. *Freshkills. Recycler La Terre*. Monts: La Contre allée.
- Thomas, Suzie, Vesa-Pekka Herva, Oula Seitsonen, and Eerika Koskinen-Koivisto. 2019. "Dark Heritage" C. Smith (ed.), *Encyclopedia of Global Archaeology*. Cham: Springer.
- Tsing, Ana Lowenhaupt. 2015. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton: Princeton University Press.
- Valente, Sandra, Celeste Coelho, Cristina Ribeiro, Anne-Marie Guihard-Costa, Eduardo Ferreira da Silva, and Manuela Inácio. 2016. "Environmental Pollution and Human Health: Exploring Adverse Pregnancy Outcomes and Food and Water Consumption in

- Estarreja Municipality, Portugal.” In *9th ISEG – International Symposium on Environmental Chemistry, 15–22 July*. Aveiro: University of Aveiro.
- Wateau, Fabienne. 2018. “Entre Terre et Eau Contaminées: Populations, Institutions et Perceptions Du Risque.” In *X Congresso Ibérico de Gestão e Planeamento Da Água, University of Coimbra, 6–8 September*, AT4-C30: 1–12.
- Wollentz, Gustav, Sarah May, Cornelius Holtorf, and Anders Högberg. 2020. “Toxic Heritage: Uncertain and Unsafe.” In *Heritage Futures: Comparative Approaches to Natural and Cultural Heritage Practices*. UCL Press.