

– REPRESENTING POLLUTION AT THE AGRARIAN-URBAN FRONTIER: Participatory Documentary Film-Making in Bar Elias, Lebanon

HANNAH SENDER, HANNA BAUMANN AND JOANA DABAJ

Abstract

The Beqaa Valley in Lebanon has become increasingly polluted, and residents are attributing illness to improper waste disposal and dumping. This article explores local epistemologies of pollution's causes and effects in three films, which were researched and produced by local residents of Bar Elias, a small town in the Beqaa, which has rapidly urbanized as a consequence of mass forced migration to the area. We approach pollution in Bar Elias as a form of slow violence whose causes and effects become more available to understanding through local epistemologies. The films speak through visuals of dirt, waste and discolouration, as well as inter-generational and cross-community storytelling. We suggest that the filmmakers are thus able to reign in the complex and dissipating connections between polluters and pollutants that challenge slow violence by adopting a spatial lens on broad struggles impacting Syrian, Lebanese and Palestinian residents. This spatial lens foregrounds pollution as an outcome of Bar Elias' location at the agrarian-urban frontier—a distinct political geography from which we analyze power relations that create pollution and expose communities to harm. We argue that this political geography lens on the films offers a promising epistemology of slow violence.

Introduction

In 2019, we worked with a group of Syrian, Lebanese and Palestinian residents of the Lebanese town of Bar Elias to produce short documentaries about challenges connected to infrastructure in the town. The resulting three documentaries—‘I am Here’, ‘Waste Journey’ and ‘It was a River’—are explorations of infrastructural provision and failure within the town.¹ Bar Elias is a small but rapidly growing town, located in the Beqaa Valley, an agricultural region in Lebanon.² It is situated on the Beirut–Damascus Highway and is equidistant from the two cities. The Beqaa Valley's agricultural economy has suffered due to decades of governmental neglect and has experienced dramatic change in the past decade as a result of mass forced migration from Syria. Whilst each of the films focuses on a different topic—housing, waste and water—common themes recur across the films, including environmental degradation and pollution.

In this article, we examine how pollution is understood and represented by the local filmmakers and by the residents they interview. We interpret their films as efforts

Thank you to Professor Mona Harb for reviewing an early draft of this article and offering invaluable advice. Thank you to the local researchers whose documentaries are the topic of this article. And finally, thank you to Ramona Abdallah from CatalyticAction and the team at Salam Ya Sham, whose collaboration on ‘Documenting Lebanon's double crisis: Film-making as research’ made this work possible. ‘Documenting Lebanon's double crisis: Film-making as research’ was funded by UCL Grand Challenges and co-facilitated by the Syrian run media organization Salam Ya Sham and the CatalyticAction organization.

- 1 You can watch the films at the following URLs: ‘I am Here’: <https://www.youtube.com/watch?v=9NXR8Hzl8C0>; ‘Waste Journey’: <https://www.youtube.com/watch?v=1FqNOPoAvTs&feature=youtu.be>; ‘It was a River’: <https://www.youtube.com/watch?v=gd47JhVNWfc&feature=youtu.be>.
- 2 We conducted this research and wrote this article before 7 October 2023 and the escalation of hostilities between Israel and Hezbollah. Since 8 October 2023, the Israel Defense Forces have destroyed almost 100,000 homes and displaced approximately 1.3 million people (World Bank, 2024b), including from the Beqaa Valley. These attacks have further damaged the environment.

to trace and represent pollution as an outcome of 'slow violence' (Nixon, 2011). We argue that the filmmakers link the way pollution is directly experienced by residents on the one hand, and the complex assemblages of institutions, industries and individuals which create polluting conditions on the other. By attending to the filmmakers' attempts to make sense of the complexities of pollution's causes and effects from within Bar Elias, we argue that the films locate pollution within a specific political geography: what Thomas Cowan (2024) calls the 'agrarian-urban frontier'—an urbanizing space which is not yet, and is not guaranteed to become, urban. We suggest that a spatial lens which focuses on the agrarian-urban frontier can support a politically incisive interpretation of polluted environments that does not oversimplify complex power relations or erase speculation, and that at the same time utilizes embodied knowledge.

The films present multiple perspectives on pollution, its causes and its effects, and refuse to settle on a single or simple argument about where pollution has come from. Given the ambiguities surrounding pollution's causes and effects, we follow anti-colonial and feminist scholarship on pollution, particularly Max Liboiron (Liboiron *et al.*, 2018; Liboiron, 2021) and Thom Davies (Davies, 2018; 2022), to approach pollution as a form of 'slow violence': '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' (Nixon, 2011: 19). Despite the challenges of representing slow violence, we suggest that an anti-colonial approach to knowing and representing pollution offers a way of interpreting pollution as slow violence through the perspectives of local residents. While Nixon's work focuses on literature as a medium, we suggest that the filmmakers are able to represent the slow violence of pollution through local epistemologies of sensing and storytelling communicated through audio-visual vocabularies, which speak through inter-generational and cross-community storytelling, bodily ill-health and visuals of dirt, chemicals and waste.

– Forced migration and the 'urban crisis' in Lebanon

Bar Elias is a commercial center for the primarily agricultural region of the central Beqaa Valley in Lebanon's East, whose agricultural economy historically benefited from natural irrigation from the Litani River and fertile soil. It is located 15 kilometres from the Masnaa Lebanon-Syrian border crossing. The population of Bar Elias has soared since the Syrian Civil War began to displace Syrians from their homes in 2011. Population estimates for Bar Elias differ, but generally suggest there are 60–70,000 Lebanese residents, as well as 7,000 Palestinian residents (UNDP, 2018; Dabaj *et al.*, 2021). There were 27,220 registered Syrian refugees in Bar Elias in 2022, but estimations of the actual population vary wildly, offering numbers between 70,000 (Public Works Studio, n.d.) and 130,000 (H. Darwish, 2024).

Since 2011, the long-term displacement of thousands of Syrians to small towns like Bar Elias in the Beqaa Valley—possibly doubling population sizes in a decade—has increased demand for housing and other infrastructures (UNDP, 2018). In response to Syrians' displacement, the Government of Lebanon has adopted a policy of 'nos': No to the formal recognition of refugees, and no to the establishment of refugee camps (The Legal Agenda, 2016; Fakhoury, 2017; Sanyal, 2017). The Government's ban on formal refugee camps meant that propertied families came to play a key role in providing housing for forced migrants, renting out existing properties and developing or reallocating agricultural and uncultivated plots for housing (Dabaj *et al.*, 2021). The growing rental housing economy in small towns following mass forced migration represented a new phase of Lebanon's decades-long shift toward rentier capitalism and away from productive economies such as agriculture (Baumann, 2019), now emerging from small urban areas. The shift toward a rental economy was also exacerbated by the collapse of the Lebanese lira in 2019, which incentivized redirecting money from banks toward land-based development.

In tandem with this economic shift toward a rental economy, the agricultural economy has become increasingly dominated by large farm owners, who have been more able to consolidate land titles, afford imported materials and access the export market than small farm owners and are more connected with the urban commercial class and political figures (Hamadé, 2020; Sajadian, 2020; Arafeh and Sukarieh, 2023). Agrarian capitalists have been able to benefit from an increase in available labor with the arrival of forced migrants, and increased competition for work between residents: reducing wages while maintaining productivity for consumers in national and international markets (Hamadé, 2020; Sajadian, 2020). On the other hand, small farm owners and small agrarian business owners have struggled to sustain a livelihood without larger land holdings, integration into the export market, and funds for imports (*ibid.*). In towns with large, forced migrant populations, propertied families who are able to rent their property can benefit from soaring rental demands in an otherwise economically challenging environment that has become dominated by a small group of connected elites (Fawaz *et al.*, 2022). The devolution of shelter management to property owners has thereby created opportunities for landlords to exploit agricultural land for rents (*ibid.*), rather than cultivation. Those who do not have land to rent, nor well-connected agricultural businesses, are therefore likely to feel immense financial pressure. Over 50% of residents in the Beqaa Governorate (in which Bar Elias is located) are estimated to be living in poverty (World Bank, 2024a).

In light of Syrians' displacement to urban areas in Lebanon, Mona Fawaz has argued that the 'refugee crisis' is an 'urban crisis' (Fawaz, 2017: 101). This 'urban crisis' framing proposes that forced migration intersects with long-standing struggles around access to urban goods and services, including housing, work, the provision of affordable infrastructure and mitigating the impacts of environmental crises (Pasquetti and Sanyal, 2020). The 'urban crisis' lens highlights the impacts of these struggles on some long-term residents, as well as forced migrants (Sender, 2021; Fawaz *et al.*, 2022). The notion of the 'urban crisis' expands our analytical lens to include broader historical and place-specific changes that relate to the urbanization trajectory, such as infrastructural warfare (Graham, 2010) during the Lebanese Civil War (1975–1990) and the July War of 2006, rapid population increases, rampant property development and infrastructural degradation. Major events and everyday governance practices degraded water, waste and energy infrastructures in Lebanon, which failed to meet the needs of all residents prior to mass forced migration from Syria, with ad-hoc solutions leading to severe environmental pollution, ill-health and loss of income to expensive private providers (Baumann and Kanafani, 2020).

– Infrastructural failure and pollution

People who are poorer and who live in agrarian or rural places bear the brunt of infrastructural disconnectivity and failure (Verdeil, 2016; Arsan, 2018). Sub-national municipal governance plays a major role in shaping geographical variation in access to infrastructure. All municipalities in Lebanon are significantly under-resourced, but their capacity to attract limited funding from the government depends on several factors, including votes for political parties in the central government (Parreira, 2020). Funding dispersed by the central government does not factor in the number of non-Lebanese residents who also use municipal services, nor Lebanese citizens who live in the municipality but are not registered there from birth or through marriage (UN-Habitat, 2021). This has recently become a major problem for small urban places in historically agrarian regions, which have experienced high rates of population growth as a result of mass forced migration, such as the municipalities in the Beqaa. While the forced migration of Syrians has opened the door for direct finance for municipalities from international donors and humanitarian agencies (UNDP *et al.*, 2020), funding has fallen significantly short of projected need and municipal budgets continue to

be insufficient to maintain basic services and to extend infrastructure to settlements (Kikano *et al.*, 2021), which are particularly common in rapidly urbanizing agrarian areas of Lebanon such as the Beqaa Valley.

In response to a dire need for infrastructure, a network of central and municipal state actors, private companies and humanitarian organizations has sought to deliver services to residents at the municipal scale. In post-war Lebanon, oversight of service provision is fragmented across different public and private sector institutions, which have been framed variously as sectarian assemblages (Nucho, 2016; Bou Akar, 2018) and as assemblages of elites who abuse their power to extract wealth, largely regardless of sectarian affiliation (Leenders, 2012). Despite the issuance of several laws granting authority to municipalities to deliver infrastructure and other public services, ministries within the central government, regional authorities and international organizations continue to run their own overlapping projects and fail to provide sufficient financial and administrative resources for increasingly complex technologies (Darwish *et al.*, 2021; Farah, 2023). A siloed approach to infrastructural provision is yet to solve the issue of maintaining services that rely on a constant supply of technology, which the state does not provide (Yammine and Salame, 2024). The deconcentration, as opposed to decentralization, of service provision from central government to municipalities has resulted in a strengthening of central government, as municipalities continue to depend on the central state for funding and support (Harb and Atallah, 2023), and ambiguities around authority to plan for infrastructure and responsibility to provide it (Eid-Sabbagh, 2023). This uneven deconcentration of responsibilities from central government to municipal governments contributes to the strengthening of elites' power over local government and the capacity of politically connected elites to exploit natural resources with impunity (Boswall and Minkara, 2021).

Political will *not* to connect certain communities to infrastructure also contributes to disconnectivity and harmful practices. The Government of Lebanon has been 'adamant' not to connect Informal Tented Settlements (ITSs)—in which the majority of forced migrants in the Beqaa live—to national water and wastewater networks (Baumann and Moore, 2023: 1231), likely due to the fear that this would legitimize and cement their presence in Lebanon. Some NGOs providing services to the ITSs have said that they have no choice but to set up 'ad hoc solutions, such as latrines directing sewage into the river' (*ibid.*). Residents of informal tented settlements have attempted to meet their own infrastructural needs by creating their own water and electricity connections, 'disfiguring the environment' (Kikano *et al.*, 2021: 438).

Various ministries, sub-committees and sector authorities share responsibility for managing pollutants (UNDP *et al.*, 2020). The Ministry of Environment (which is primarily responsible for addressing environmental pollution) has one of the smallest day-to-day budgets among the ministries, standing at under USD 1 million in 2020 (*ibid.*). All of the ministries within the Executive branch of the Government of Lebanon have been beset by political upheaval, political deadlock and severe lack of financial resources, particularly following the 2019 financial collapse.

The insufficient infrastructural provision has led to significant issues with pollution and has had severe health impacts for Lebanese residents. E. Coli in the Litani River has exceeded the 'acceptable limit' for natural water sources: a condition which has been attributed to untreated sewage from towns and informal settlements, as well as industries, including quarrying (Dagher *et al.*, 2021). A cholera outbreak in 2022, which affected at least 5,000 people across Lebanon and led to at least 23 deaths, was attributed to untreated wastewater (Helou *et al.*, 2023). Most municipal and industrial wastewater flowing into the Litani is untreated (T. Darwish *et al.*, 2021). Solid waste disposal sites on riverbanks also contribute to the contamination of water (*ibid.*). This is particularly concerning in the Beqaa Valley, where the Litani is the main source of irrigation for agriculture. Pollutants have contaminated food produced in the Beqaa (Faour-Klingbeil

et al., 2016; Mcheik *et al.*, 2018). Planned waste treatment facilities in the Beqaa have already been predicted to fail to meet the needs of the population (Farah, 2023).

As demands on water and waste infrastructures have increased with a growing population, pollution has become associated with Syrian forced migrants as a means of legitimizing their removal (Baylouny, 2020). By arguing that informal settlements are a main source of the river's pollution, the LRA has evicted 1,500 Syrians from their homes (Vohra, 2019). Through a litigious narrative citing ITS residents as causes of the Litani River's pollution, Syrians living in settlements have joined those people marked as 'abject' subjects whose presence is associated, even conflated, with pollutants (Baumann and Massalha, 2022).

In this article, we examine how pollution in Bar Elias is entwined with the dynamics of governance at an agrarian-urban frontier affected by mass forced migration. By focusing on Bar Elias as an urbanizing—if not widely considered 'urban'—place, we encourage a reading of urban theories that extend our gaze beyond the city as a place of arrival toward small, but rapidly growing urban populations and environments, to contribute to a dynamic interpretation of how the urbanization of traditionally agricultural spaces, forced migration and pollution intertwine.

Literature review

This article engages with two scholarly debates. The first concerns the political geographies of pollution, examined through the lens of urbanization and governance at the agrarian-urban frontier, drawing on frameworks of planetary urbanization. The second concerns how pollution and its causes are known and represented.

– The agrarian-urban frontier

In the early 2010s, Brenner and Schmid famously argued that the 'erstwhile hinterlands' and 'wildernesses' of the world have been subsumed into the urban (Brenner and Schmid, 2013: 162). The capitalist-industrialist expansion into these formerly 'non-urban' spaces, they argued, caused a 'planetary urbanism' to emerge. Although everything, everywhere, is made integral to the urban (*ibid.*), the capitalist-industrial complex produces a hierarchy between places, with the metropole at the center of capitalist power and the hinterlands and wilderness rendered subservient to the aims and logic of capital. Capitalist-industrial expansion reconfigures hinterlands—becoming the site of factories, depots, resource extraction areas—and causing the wilderness to be 'harmed and degraded' (*ibid.*). In the Beqaa Valley, the Litani River has been exploited for hydroelectricity generation, with hydroelectric plants providing kilowatt-hours 'exclusively to Beirut' (the Lebanese capital) and no infrastructure for irrigation or potable water requested by local communities (Lawson, 2024: 9). The Litani River's waters have been allowed to become polluted, whilst continuing to function as a resource for the capital, through a process Owain Lawson calls 'organized abandonment of the country's rural surplus population' (*ibid.*: 1). Refusing to give up on the notion of the 'rural' altogether, Kelly-Reif and Wing suggest that the relationship of the urban to the rural is 'parasitic' (Kelly-Reif and Wing, 2016: 350): reliant on the maintenance of rural hinterlands as production sites for people located in the cities.

Theorists of urbanization from the frontier have particularly highlighted the role that local businesspeople, politicians, landowners and other local elites play in harnessing their own capital to accumulate more with the arrival of further opportunities (Caldeira, 2017). The agrarian-urban frontier can be a place from which harms emerge, rather than merely a place where harmful effects are located by a distant metropole. A dynamic network of differently powerful actors, who can be located outside and within the agrarian-urban frontier, neglects people to harmful conditions in the name of profit.

– The slow violence of pollution

Environmental destruction is often an act of what Rob Nixon calls slow violence: ‘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’ (Nixon, 2011: 19). Determining responsibility is fundamental to the politics of resisting polluting activities that harm environments and the people who live within them (Alexander and O’Hare, 2023). However, the very nature of slow violence poses distinct challenges to knowledge production and resistance ensuing from it. Since the destruction wrought by slow violence is ‘dispersed across time and space’, it is difficult to draw a clear line between cause and effect. The Lebanese state has been called a state of ‘hybrid sovereignties’ (Fregonese, 2012): an assemblage of state and non-state actors with overlapping jurisdictions that generate uncertainty about responsibility. The ‘archipelago of overlapping institutions’ (Lawson, 2024: 4) makes it difficult to determine who is responsible for providing and maintaining infrastructures, and leaves room for political parties, associated institutions and individuals to receive benefits without being accountable to residents. This difficulty leaves room for doubt of knowledge (Davies, 2022; Alexander and O’Hare, 2023), including knowledge from official or authoritative sources such as environmental scientists or politicians, and one’s own knowledge. Auyero and Swistun’s (2008) concept of ‘toxic uncertainty’ points to the space for rumour, suspicion and conflict between different ideas about how pollution happens. The ‘uncertainty’ of contaminants allows people to associate certain communities with pollution, legitimizing their dispossession from land (Basbous, 2023), and allowing authorities and elites to commit certain communities to slow violence without acknowledging pollution and its potential harms (Nixon, 2011). In South Lebanon, continuing doubt about the toxic effects of Israel’s weapons has allowed political representatives to avoid responsibility for detoxifying landscapes, committing residents to ‘slow, belated and potential’ injuries that blur the temporal boundaries of ‘war’ (Touhouliotis, 2018: 88).

Liboiron challenges us to look beyond individual harms and differential vulnerabilities to harm. They argue that scholars ought to ‘[look] upstream to see the structures of violence’, which gradually dispossess people of valued relationships with land (Liboiron, 2021: 34). Given the challenge to understanding the causes of pollution posed by slow violence, ‘looking upstream’ is difficult. However, we contend that whilst knowing pollution and its causes is fraught with dispersal across space and time, a relational understanding of place is important to how we conceptualize slow violence and this dispersal of harms. Where and when pollution is known from is of fundamental importance to the politics of pollution, including debates that present plausible violent actors. Producing a theory of slow violence that foregrounds places where violence ‘coagulates, leaves its traces’ (Navaro *et al.*, 2021: 3) not only allows us to gesture toward the material, embodied and locally embedded harms of violent structures but also to ‘trace political violence as its crosses substances, fields and dimensions, analyzing how it is reconfigured, how it assumes other chemistries, or appears in new molds’ (*ibid.*: 13).

Despite the challenges of representing experiences of injustice, the rural can be a site of resistance against planetary urbanization, particularly against extractivist practices, and can disrupt relations that dispossess rural residents (*ibid.*). Wang *et al.* locate the power of the rural within the relationships between the human and the non-human, including the earth, water and plant life (2023). This is particularly relevant in the context of pollution and the possibility of sustaining life within the polluted agrarian–urban frontier. Hence, even when powerful actors neglect others to harmful conditions, people find ways of sustaining life through maintaining relations with the polluted earth and water (Liboiron *et al.*, 2018). Indeed, the very disruptions caused by urban change and pollution can be generative of a ‘toxic politics’ that deals with, and potentially resists, slow violence (Liboiron *et al.*, 2018). We propose that the filmmakers

take up Liboiron's challenge to 'look upstream' to see the structures of violence that cause pollution and its harms. We interpret these films as explorations of pollution's causes and effects, from the vantage point offered by Bar Elias' material reality and residents' experiences. Through this, the films can tell us about how Lebanon's urban governance dynamics have shaped the agrarian-urban frontier.

– Knowing pollution

Representing pollution is a politically important act. Pollution is both a material presence and a symbolic category (Dürr and Jaffe, 2014), which has the function of 'naming a deviation from the good and true path of things—good relations manifested in the material' (Liboiron, 2021: 19). Pollution has 'moral overtones' (*ibid.*), which cast blame on polluters and compel actors involved in the management and prevention of pollution to act. In what Max Liboiron refers to as Western Colonial Science, pollution is a measurable concentration of particulates that has gone beyond the threshold of nature's so-called 'assimilative capacity', or the environment's ability to absorb a certain amount of the particulate in question before its chemical behaviour changes (Liboiron, 2021). In these environmental science discourses, pollution maintains its moral overtones and is associated with excessiveness, harm and mismanagement, remaining firmly within the realm of human control over land and nature. However, governance is often dispersed across multiple institutions, which must agree upon and engage with what Davies calls a 'complex assemblage of corporate power, state authority, local regulations, and capitalist structures of accumulation' (Davies, 2018: 1539). The governing authority and polluter can overlap, and indeed do, in the case of Lebanon.

There are other ways of knowing, and of living with, pollution. These sit alongside (and do not necessarily counter) Western Colonial science epistemologies, but they come from a different starting point (Liboiron, 2021). At least some of these epistemologies are embedded in specific social and cultural contexts. While they cannot therefore be generalized, they are distinct from the Western Colonial scientific ways of knowing pollution in terms of their processes of interpretation and their epistemologies of nature and land. Pollution is known through encounters with the environment, experienced as bodily harm and narrated between members of a community (Shapiro, 2015; Touhouliotis, 2018; Davies, 2022; Berger, 2024). These ways of knowing pollution shift ways of thinking about pollution away from the absolutist and universalizing sciences of environmental pollution studies, and toward epistemologies of the body: informed by the senses, and passed from person to person through inter-generational storytelling, which carries memories of place forward (Ortiz, 2022). Crucially, these interpretations evolve as toxicities emerge and alter over time, making slow violence somewhat more knowable, even if it cannot be made wholly unambiguous (Davies, 2022).

The arts have played a central role in communicating slow violence, by virtue of their capacity to 'address unknowability (of complex systems, of mutable substances) as an issue head on, rather than seeking to overcome it' as per the majority of academic scholarship (Baumann, 2024: 256). The arts can help audiences to 'bring home—and bring emotionally to life—threats that take time to wreak their havoc' (Nixon, 2011: 14). Documentary films, like the imaginative writing that is the focus of Nixon's scholarship, can render these threats 'apprehensible to the senses through the work of scientific and imaginative testimony' (*ibid.*). Documentary film-making and artistic films, such as Karim Eid-Sabbagh's 'We made every living thing from water' (2015), have made pollution in Lebanon apprehensible to audiences situated elsewhere. Eid-Sabbagh connects images of waste to infrastructures that favour high returns on investment and harm the natural environment by interviewing experts and residents living with 'the crisis' (Eid-Sabbagh quoted in Garrard, 2019). By 'inviting' rumours, storytelling, unverified archival documents and contested testimonies, artists can question narratives that demand 'scientific proof' by highlighting challenges of representation (Baumann, 2024:

261). Creative approaches of engaging with embodied effects of violence lead the way for some methodological experiments in the social sciences (Bathla, 2024). In doing so, the arts can ‘engage with the continuum of violence’ (Baumann, 2024: 261) without pretending a clear narrative of culpability.

Methodology

This article examines local epistemologies of pollution in the Beqaa Valley through three short documentary films produced by local residents in 2019. The films were produced as part of a participatory research project with citizen scientists (local researchers) living in Bar Elias. The research project was a collaboration between researchers Hannah Sender and Hanna Baumann, researcher and co-director of CatalyticAction Joana Dabaj, researcher Ramona Abdullah and Syrian-led Media NGO Salam Ya Sham. The five local residents employed as local researchers—Moayad Hamadallah, Amro Al-Mais, Asmaa Al-Hajj Khalil, Mehdi Al-Homsy and Ali Rheil—are of Syrian, Palestinian or Lebanese nationality and were aged between 19 and 44 years. They were initially recruited for and were participating in a Participatory Spatial Intervention, as part of the project ‘Public services and vulnerability in the Lebanese context of large-scale displacement’ funded by the British Academy’s Cities and Infrastructure program (Dabaj *et al.*, 2020). Local researchers were recruited by CatalyticAction via an open call, disseminated among key local stakeholders and organizations. The film-making project was implemented as an outreach and engagement aspect of this larger project, with ethical approval from University College London (UCL) and additional funding from UCL Grand Challenges. As part of the Bar Elias Participatory Spatial Intervention, local researchers were asked to challenge existing power relations between Syrians, Palestinians and Lebanese residents, men and women, young adults and adults, by ensuring all voices were taken into consideration and reflecting on who would be impacted by the research process (see Dabaj *et al.*, 2020: 30 for further details). In a later discussion about this article, the local researchers said that they made a decision to focus on Bar Elias’s history and contemporary social-political conditions in the films. They said that this approach led them away from narratives that place blame on particular residents.

The project had two objectives. The first was to learn whether and how film-making processes, including interviews and walks, oral-visual documentation, and presenting an analysis through film, could be used as a research method for exploring social science questions in a collaborative resident-led approach. The second was to understand how local residents understood and framed the relationship between infrastructure and displacement. The project sought to understand how mass forced displacement to Bar Elias and Lebanon more broadly intersects with broader struggles around public service provision. It therefore sought to locate displacement within wider forms of structural and slow violence. This was particularly important for research in the Beqaa, where a significant proportion of Lebanese and other long-term refugee and migrant residents are poor or extremely poor and have limited access to functioning and affordable water, waste and energy infrastructures (UNHCR, UNICEF and WFP, 2021).

The project’s methodology was therefore a significant question within the research, which asked how filmmaking could be learned and used by local filmmakers to examine complex relations, such as slow violence. We chose film for its capacity to document and to disseminate sensory experiences of environments and encounters with other people and with non-human entities (Papanicolaou, 2024). Film, as an audio-visual medium, would be able to document the sights and sounds of Bar Elias, as well as the people who live in their town and their stories, which were told not only through words but through facial expressions, gestures, emphasis and changing volumes of speech. Films are therefore multi-sensory and can be multi-perspectival, particularly when filmmakers work collaboratively on films as they did in this project.

Sender, Baumann and Dabaj established this overarching theme of the films and their broad definitions, and co-designed a training program for the local researchers, in which the researchers would learn documentary film theory, storytelling and filming techniques, as well as qualitative research skills, including research question design, interview methods and thematic analysis. CatalyticAction and Salam Ya Sham led the technical and narrative training of the researchers and supported them to deliver three final films, including completing the final edit after participants had agreed on the storyboard. The local researchers selected their topics for their films based on their experiences of living in the Beqaa Valley and their personal interests. The topics were pollution of the Litani River, solid waste management and urban expansion and housing conditions. Whilst each of these topics was treated in separate films, there was overlap between the films in terms of the urban change the films documented and the ways of knowing and of living with degraded public and private environments that the films portrayed. All three films focused on local residents' experiences of the Beqaa Valley, their stories of urban change and how they responded to those changes. Local researchers decided that their aim was to highlight broad issues related to urban planning and infrastructure and to avoid putting blame on particular groups, particularly forced migrants. They also opted to take a long-term view on issues, which places more visible events like the mass forced migration of Syrians within a historical context. This might have been the result of their previous training as part of the Participatory Spatial Intervention, in which citizen scientists were asked to challenge power relations between groups and to ensure that the voices of different resident communities—including Lebanese, Palestinian and Syrian—were heard in the research.

It is also relevant to note that the choice to work in towns in the Beqaa Valley with local Lebanese, Palestinian and Syrian residents counters a 'methodological cityism', which is characteristic of urban political ecology (Castán Broto *et al.*, 2012). We cannot assume that the experiences and epistemologies discussed in this article are generalizable to other agrarian-urban contexts. However, the process of documenting and sharing these local ways of knowing and living with pollution and waste management processes can be considered elsewhere, as can some of the ways in which people create and share their understandings of their changing environments with others in their communities. This includes intergenerational and cross-community storytelling, sensing with one's body, and the audio-visual vocabularies, which are used by the local filmmakers. The findings section focuses on these ways of knowing and of sharing knowledge, rather than documenting the specific harms that residents have experienced.

The films

'I am Here' (4') opens with a view over Bar Elias. In the foreground, we see a vast plain, covered with medium- to low-rise buildings. A narrator informs us that there has been a lot of haphazard construction over the last 10 years, and that the town has never been as densely populated as it is now. This has been an 'unplanned urban expansion', catalyzed by the increase in the number of inhabitants of the town. We dive down into the streets of the town and are shown 'a set of interlocking, cement cubes': unfinished buildings, unplastered breezeblocks and rubbish from building sites piled to the sides of the road. We are told that many of these buildings have been built without planning permission. A shot shows dark-colored water running in a small stream down the road, as the narrator informs us that in the winter, rainwater brings in trash, 'causing pollution and floods'. He tells us that 'pollution, health vulnerability, and the lack of shared spaces for meeting and encounter' plague this town. In interviews, Syrian tenants explain that they pay high rents for small apartments with exposed cables and flooded rooms. The tenants show the filmmaker around their home, gesturing toward places where water seeps in. A Palestinian man invites us into his dilapidated home. He is a landlord to

Syrian tenants, but he says he treats them as family who have suffered a similar fate to the Palestinians.

'Waste Journey' (6') tells two parallel stories of waste infrastructures in Bar Elias. Initially, we see a municipal waste sorting factory, where workers wearing protective gear maneuver huge trucks and stand on a sorting line processing plastics, aluminum and cardboard. Quickly, we cut to an informal tented settlement where three young Syrian boys are pulling plastic carts on wheels. As they walk along the roads, they pick up pieces of litter that have been thrown to the side. They enter the bin rooms of apartment blocks, dunk their hands in bins, and pick up any plastics and aluminum that they can find. The boys are interviewed about their day. One of them explains that he wakes up at five in the morning and collects rubbish from around his camp. He sells anything he can find at the junkyard. He earns 5,000 Lebanese lira (approximately USD 3 at the time of filming) from the men who run the junkyard, some of which he spends at the small grocery store in his settlement before giving the rest to his mother. An older woman is interviewed and explains that there had been a campaign by a German NGO to improve recycling in the area, but that when the project ended, she continued in an effort to help the boys. She was worried about them contracting diseases from handling the rubbish.

The final film, 'It was a River' (4'), laments the pollution of the Litani, which runs alongside the town. In the opening scenes, the camera rapidly shifts from riverbank to riverbank as we hear the sounds of a person gasping for breath. Long-term Lebanese residents share stories of how their family members and neighbors have contracted lung, stomach and throat cancer from living beside the river and from inhaling its 'stench'. Even while interviewees sit beside the water, they say they are afraid the same might happen to them. The river, we are told, had once been a blessing for the region. Over time, it has become 'a curse' with its smell, its appearance, its black color. An older man explains that 'everyone used to drink from the water, drink from it!' Now, he can see tanning chemicals. He says that they used to grow crops using water from the Litani, but now the water comes out like soap foam.

Farmers have been prohibited (presumably by the state) from drawing water from the river. A vegetable seller explains that he will not sell vegetables that have been grown in the local area because they are irrigated with water from the Litani. Several of the interviewees allude to pollution from other places which have destroyed the lands of Bar Elias—one refers to the factories in a wealthier town upstream called Zahlé, though another says, 'I do not know which village diverted their sewer to us'. Over time, entire families have progressively sold their agricultural land, as they get less and less from it each year. Having grown okra and watermelon, having washed in the waters and caught rainbow-coloured fish from the river in the past, one man says that people 'are being killed on the land of Bar Elias'.

Discussion

In all three films, the voices of local Lebanese, Palestinian and Syrian residents are joined with visuals, music, and sound to describe the built and natural environments of Bar Elias. The human and the non-human intermingle in ways that are uncomfortable and threatening. Water trickles down internal walls and through concrete streets, packaging blocks river flows and oily slicks float on the river's surface. The narrative voice of 'I am Here' describes Bar Elias as becoming more polluted, linking the visuals of solid waste and discolored and out-of-place water with an imminent threat to the residents. Pollution can be seen with the naked eye in all three films. According to the residents, it can be smelled as a stench, and its effects are made audible in the gasping for breath. The films represent pollution tangibly to their viewers, who may not know nor ever visit Bar Elias, in an audio-visual language of dirt, waste, discoloration and human voice. The opening scene of 'It was a River', with its sound of the shallow, rapid

and panicked breathing, is dramatic for a documentary film: It communicates and elicits stress, establishing the human, embodied impact of pollution and the centrality of the immediate experience that the film develops.

This embodied way of knowing pollution as a presence within the environment is woven into observations of ill health among relatives and neighbors. The presence of cancer in family members' lungs, throats and stomachs is drawn upon as evidence of the effects of pollution, joining observations of waste and discolored water. These observations are accompanied by more speculative statements about the wider impacts of polluted soil and waterways on the residents. As one man put it in 'It was a River', 'they are saying that the cancer rate is the highest it's ever been in Bar Elias'. More speculative gestures about casualty and trends that are reminiscent of 'toxic uncertainty' (Auyero and Swistun, 2008) accompany embodied, material evidence that the land has become littered by waste, that river water has changed color and that people are dying of cancer.

Alongside the sensory experience of living with pollution in the present, the films indicate that pollution is not *only* an embodied contemporary experience but rather has emerged over time. People can remember what life was like before pollution, and pollution has affected families over generations. In 'It was a River', we learn that gradually, generations of farming families have sold their land as the soil produces fewer crops each year. This 'delayed destruction' (Nixon, 2011: 19) to the lands of Bar Elias means that the causes of pollution are difficult to know.

The films gesture toward potential origins of the pollution. They speculate, together, that perhaps unplanned urban expansion in the past decade has something to do with the situation worsening (as the narrator of 'I am Here' implies). In 'I am Here', residents themselves—those who build without permission or regard for shared space—are named as potential culprits, as are the planning authorities who fail to plan for urbanization and neglect the town, leaving its rampant development to the random effects of private interests. In 'It was a River', however, polluters are located outside of the town, in upstream cities and factories that dump their waste in the river.

However, the filmmakers themselves do not tell the viewer who is responsible. Instead, they give space to residents themselves to speculate and to accuse, proposing multiple perspectives on the issues of governance and pollution. As there is no clear culprit who causes pollution, and polluting activities occur both within and outside of the town, the films reflect a series of controversies that circulate around Bar Elias (Farah, 2023). 'Waste Journey' might actually be representing scenes that overestimate Government support for waste management in Bar Elias, as the film documents an operational waste sorting factory, which had been established by an International NGO and then given to the municipality of Bar Elias to run. In team discussions during the filmmaking process, the filmmakers said that when they first visited the site, the factory was not operating. However, when they asked permission to film, the manager arranged for the machines to be turned on. The filmmakers opted to present the factory in its operational state, whilst knowing that the factory may not actually have been operating. This is consistent with the finding that despite having an available treatment capacity of 6,390 tonnes per day, the current waste treatment factories in Lebanon process only 440 tonnes per day, or 6.8% of their capacity (Ministry of Environment, Council for Development and Reconstruction and World Bank, 2024). The filmmakers explained that they opted not to include this information, as there was uncertainty about how long the factory was non-operational, and the reasons for this.

Despite the opacity of pollution's causes and of the state's role in combating it, the films present a spatial perspective and logic which place Bar Elias as a site of extraction and of disposal relative to other parts of Lebanon. Agricultural businesses have taken what they can from the soil and waterways, factories in the wealthier town of Zahlé upstream have dumped waste products into the rivers running into Bar Elias,

and local landowners have built homes for an expanding rental market without proper consideration of their broader impact. As one of the interviewees exclaimed, 'they are killing us on the lands of Bar Elias'. While 'they' remain a shadowy, plural subject, there is certainty that the lands of Bar Elias are the means by which residents are being exposed to harm.

People nonetheless remain in Bar Elias and are compelled to live with the pollution which harms themselves, their families, and their neighbours. As the filmmakers enter people's homes for 'I am Here', we can see that tenants have built barriers in their own homes, using cushions to keep water at bay. In 'Waste Journey', vehicles scoop vast mountains of household waste and move it through machinery, while children jump into bins and smash aluminum cans against hard surfaces. 'It was a River' shows farmers continuing to plant and harvest vegetables and fruits, despite government circulars curtailing natural irrigation practices. From the film, it is unclear whether these farmers are avoiding using water from the polluted waterways, though the implication is clear: The land is contaminated, and so is any food growing on it. These practices emerge from the need to survive economically despite pollution and have far-reaching consequences across the food supply chain, including for those consumers located in the metropole.

Some find ways to benefit (even marginally) from pollution. In 'Waste Journey', local residents work with waste and even create informal waste management infrastructures for cash. This speaks to the ambiguity of waste as a potential pollutant or a valued resource (Gidwani, 2012; 2013). However, as one interviewee points out, working with waste is a hazardous job that threatens those who continually come into contact with it. 'Waste Journey' gives us a glimpse of the hierarchies of those who deal with waste and thereby come into contact with pollutants: from the children whose health is seen to be at risk to the municipal sorters, who wear some protective clothing, to the junkyard owners who pay the children for the materials they bring in and, presumably, to those who run the foreign-funded waste sorting facility and manage it—but are nowhere to be seen in the film. The management of pollution cements and sustains hierarchies between residents, which places some—in this case, young Syrians—at further risk of harm. People in Bar Elias are sustaining life through maintaining relations with polluted environments, but it remains unresolved in the films whether this is seen as a form of resistance, what Liboiron calls 'toxic politics' (2018), or an extension and deepening of harm which is brought about by economic necessity.

Despite efforts to manage or resist the accumulation of waste in one's home and neighborhood, waste refuses neat ordering and continually threatens to become pollution. In all three films, waste is always in excess and overwhelms human machinations. The sorted piles of cardboard, plastics and aluminum in the municipal waste sorting facility are juxtaposed against that which remains on the ground. Water continues to leak through neighborhoods and walls. In 'It was a river', tanning chemicals end up in irrigation systems, and in the nostrils and lungs of residents, causing cancer. Pollution has left its traces in certain places within Bar Elias, including in the river, the streets and in people's bodies.

Pollution at the agrarian-urban frontier

In their attempts to understand and represent how the slow violence of pollution has been dispersed across time, the filmmakers' expansive lens also takes the space of Bar Elias itself—the agrarian-urban frontier—as their shared analytical focus. By taking a spatial lens on crisis, the films we have discussed indicate how rapid urbanization catalyzed by mass forced migration intersects with long-term environmental changes at the agrarian-urban frontier. The filmmakers highlight how the slow violence of pollution has emerged through the interactions between Bar Elias and other places, and how these interactions have affected the residents of the agrarian-urban frontier over an extended

period of time. Hence, the ‘urban crisis’ lens that Fawaz (2017) offers is extended through a relational approach to understanding urbanization. Theorists of planetary urbanization (Brenner and Schmid, 2013), peripheral urbanization (Caldeira, 2017) and urbanization without guarantees (Cowan, 2024) have developed this relational approach to examine urbanization beyond the imagined boundaries of the city, and to suggest how urban change is shaped by inequitable power relations between the metropole and other less obviously urban places. The filmmakers’ focus on pollution complicates the view that the extractive capitalist metropole simply subsumes the rural–agrarian into the urban. It shows that the actors who extract value from the agrarian–urban frontier—by dumping waste or building haphazardly without regard for shared spaces—are located both outside and within that frontier.

In the agrarian–urban frontiers in Lebanon, locally specific processes of capitalist accumulation are enmeshed with global events, including mass forced migration as well as international circulations of aid and waste. Since routes out of peripheral agrarian–urban areas are limited by both national and international actors, towns like Bar Elias have become places of immobility, in which forced migrants are compelled to remain (Sanyal, 2018), at risk of being caught at checkpoints and deported back to Syria (Gebeily and Madi, 2024). These forced migrant governance practices have created opportunities for local landowners to extract wages, humanitarian aid payments and debt from forced migrants in return for substandard apartments, as seen in ‘I am Here’. Humanitarian cash assistance programs have supported local rental economies, and demand for shelter in a context where there are no camps has incentivized further construction. Thus, in addition to external actors who use the agrarian–urban frontier as a ‘hinterland’ of agricultural production and a ‘wilderness’ into which to dump waste (Brenner and Schmid, 2013: 162), a complex network of international, national and local actors shapes rapid and extractive urbanization processes *within* the agrarian–urban frontier.

Knowing the slow violence of pollution from the agrarian-urban frontier

Planetary urbanization theory suggests that the harms of urbanization are (unevenly) experienced by those who live at the frontiers of extended urbanization. Pollution is usually marginal in these center-periphery urbanism debates, but it can open up new perspectives on the issue. These films observe the processes and effects of urbanization, using visuals, environmental sounds and oral histories to represent the harms which residents at the agrarian-urban frontier experience. Through these multiple perspectives, the filmmakers indicate that pollution is a harmful outcome of inequitable urban relations and urban change. The films represent a form of data and analysis in a context where hard data is unavailable, subject to doubt or the truth is purposefully obscured.

If determining responsibility is an element of countering slow violence, then the filmmakers have suggested the difficulty of attributing culpability to a single actor. Instead, they show that a complex and distributed governance network, including local and distant municipalities, industries and private actors such as landowners, pollutes Bar Elias and harms people who live there. The filmmakers deliberately chose not to single out one actor or community. By doing so, they refuse popular logics, which attempt to lay blame on less powerful people, including Syrian forced migrants themselves. In these films, knowing slow violence is not simply a means of making pollution and its multiple causalities visible, but is a complex political dance of representing and refusing to represent certain controversies.

At the same time, the films counter this ‘toxic uncertainty’ (Auyero and Swistun, 2008), which commits certain communities to slow violence without recourse to justice (Nixon, 2011), by (re-)presenting local knowledge and experience, without pretending that pollution and its impact on local communities exist in an easily apprehendable cause-and-effect relation with clearly identifiable culprits. Through

the participatory research and production process, film emerged as a powerful medium and method for co-producing knowledge about toxicity and pollution, as well as slow violence more generally. Its audio-visual capacities, which allow it to represent visual evidence of pollution, its embodied impacts and spatial afterlives in a highly tangible manner, make it widely accessible. In addition, it allows the filmmakers/researchers to center themselves and their process of knowledge production. As such, this article has sought to contribute to existing literature on the representation of toxicity and slow violence, covering methods including photographic representation (Balayannis, 2020), ethnographies (Davies, 2022) and literature (Nixon, 2011).

Conclusion

In this article, we have demonstrated how the films, created by residents of the agrarian–urban frontier, are able to render slow violence knowable from the vantage point of certain places. Local residents' knowledge of pollution is expressed through multi-sensory experiences of the environment and through storytelling between residents. By collecting immediate audio-visual data, oral histories, rumor and speculation, local residents seek to know pollution and gesture toward potential causes from their position as residents of an agrarian-urban frontier. From this vantage point, local residents and filmmakers link pollution with local place-specific changes, including the degradation of soil and waterways, as well as rapid urban development. In doing so, they articulate a slow kind of violence, which has been perpetrated across several generations and different spaces.

These films and the knowledges they present apprehend and trace the trajectories of slow violence—its causes and its effects—that are 'dispersed across space and time' (Nixon, 2011: 27). The films indicate the complex governance structures and power dynamics, which perpetuate doubt and challenge simple blaming and remediation strategies. However, they also harness local knowledge to articulate theories of violence from the agrarian–urban frontier, effectively demonstrating that Bar Elias has become a site of extraction and of dumping, as per Brenner and Schmid's articulation of the hinterland. By presenting Bar Elias as the dumpsite of activities located elsewhere, *and* as a place where haphazard urbanization is polluting the local environment from within the town, the films present a complex geographical politics of pollution. The small town is both a hinterland, polluted by industry upstream and a site of peripheral urbanization, in which local property owners have developed and polluted land, encouraged by the state's no-camp policy regarding forced migrants. The state has an ambiguous presence, as a partially responsive, ineffectual agent in pollution prevention and management, as well as a willfully neglectful actor that has refused to establish shelter arrangements for forced migrants and has allowed unlawful development. Industry, individual property owners, and the state are all entangled in a complex socio-political formation that connects the agrarian–urban frontier to centers of power. This connection blurs any clear distinction between the metropole and the hinterland when it comes to who holds the power and agency to pollute with impunity.

While the agency to pollute with impunity is ambiguously held by a complex formation of actors, these films do make a politically decisive claim: that it is the residents of the agrarian–urban frontier who are compelled to live with the harms of polluting processes, to change their practices, or to abandon the town. These residents are Lebanese and Palestinian families who built their houses by the river, and within Bar Elias' agricultural fields, Syrian laborers, farming families and vegetable sellers, who remain, make do and continue to tell stories about the illness or deaths of loved ones.

This article makes two primary claims. First, it argues that pollution results from interconnected processes—such as urbanization and forced migration—that gradually transform and degrade agrarian–urban frontiers. These changes are driven both by industrial-capitalist expansion into agrarian spaces (Brenner and Schmid, 2013:

162) and by local residents seeking to extract value from rising demand for land and resources caused by forced migration (Caldeira, 2017). This enmeshment creates a political geography of slow violence, in which violence can be enacted from outside and within the agrarian–urban frontier and which harms those who remain in the agrarian–urban frontier. This claim raises further questions concerning how urbanization at the agrarian–urban frontier affects different polluting or profiting actors. The polluters located at a distance from the frontier are less likely to experience the harms their activities create than those residents who participate in haphazard building practices. This article has focused on people who have been harmed by pollution. Future research might explore the impact of pollution and its harms on those who carry out and benefit from polluting activities in the agrarian–urban frontier but may also be subject to its spatially dispersed and temporally delayed effects.

While a lens on pollution at the agrarian–urban frontier opens new questions, it can also open up new spaces for conversation about harm and violence from the perspectives of residents located at the periphery of urban studies. The second claim that we make is that pollution is a process of slow violence (Nixon, 2011) that can be understood and represented through local epistemologies that are consciously located within the agrarian–urban frontier, and that documentary filmmaking is an effective tool for doing so. By structuring the filmmaking project with an open question about how displacement intersects with broader struggles around infrastructural provision, the filmmakers were encouraged to narrate a story that connected the immediate, material situation with a broader historical, economic and political context. By anchoring the elusive trajectories of pollution in local experiences and knowledge, the films offer a perspective on pollution and its delayed effects at the frontier of capitalist extraction, as well as residents' adaptation to a rapidly changing agrarian–urban space. Although the filmmakers demonstrate that the complex governance structures and power relations defy simplistic narratives of blame for pollution, they harness the ambiguity of slow violence to make room for rumor, debate, storytelling and diverse representations of violence processes. Refusing simple cause-and-effect narratives, local residents can investigate and represent the slow violence of pollution by representing immediate sensory engagements with the environment and intergenerational memories of rapidly changing places.

Hannah Sender, University of Sheffield, Sheffield S10 2TN, UK,
h.sender@sheffield.ac.uk

Hanna Baumann, University College London, London WCE1 6BT, UK,
h.baumann@ucl.ac.uk

Joana Dabaj, CatalyticAction, London, UK, joana.dabaj@catalyticaction.org

References

- Alexander, C. and P. O'Hare (2023) Waste and its disguises: technologies of (un)knowing. *Ethnos* 88.3, 419–43.
- Arafeh, N. and M. Sukarieh. (2023) Breaking the cycle: toward a new imaginary of the food system in Lebanon. *Carnegie Endowment for International Peace* [WWW document]. URL <https://carnegieendowment.org/research/2023/07/breaking-the-cycle-toward-a-new-imaginary-of-the-food-system-in-lebanon?lang=en> (accessed 26 October 2025).
- Arsan, A. (2018) *Lebanon: a country in fragments*. Hirst & Company, London.
- Auyero, J. and D. Swistun (2008) The social production of toxic uncertainty. *American Sociological Review* 73.3, 357–79.
- Balayannis, A. (2020) Toxic sights: the spectacle of hazardous waste removal. *Environment and Planning D: Society and Space* 38.4, 772–90.
- Basbous, M. (2023) The violence of extractive urbanization: dying to live in Lebanon. *Middle East Critique* 33.4, 571–92.
- Bathla, N. (2024) *Researching otherwise: pluriversal methodologies for landscape and urban studies*. gta Verlag, Zurich.
- Baumann, H. (2024) Representing infrastructure violence: artistic engagements with Lebanon's waste crisis. In O. Coutard and D. Florentin (eds.), *Handbook of infrastructures and cities*, Edward Elgar Publishing, Northampton.
- Baumann, H. and S. Kanafani (2020) *Vulnerability and public services in the Lebanese context of mass displacement: a literature review*. RELIEF Centre, London.
- Baumann, H. and M. Massalha (2022) 'Your daily reality is rubbish': waste as a means of urban exclusion in the

- suspended spaces of East Jerusalem. *Urban Studies* 59.3, 548–71.
- Baumann, H. and H.L. Moore (2023) Thinking vulnerability infrastructurally: interdependence and possibility in Lebanon's overlapping crises. *Environment and Planning C: Politics and Spaces* 41.6, 1225–42.
- Baumann, H. (2019) The causes, nature, and effect of the current crisis of Lebanese capitalism. *Nationalism and Ethnic Politics* 25.1, 61–77.
- Baylouy, A.M. (2020) *When blame backfires: Syrian refugees and citizen grievances in Jordan and Lebanon*. Cornell University Press, Ithaca, NY.
- Berger, M. (2024) Bioethanol sacrifice zones and environmental/epistemic injustice. A case study in Argentina. *Environmental Science and Policy* 157 (July), 103782.
- Boswall, J. and Y. Minkara (2021) Mountain to mortar: Lebanon's concrete conflicts of interest. *The Badil* [WWW document]. URL <https://thebadil.com/wp-content/uploads/2023/04/Mountain-to-Mortar-Lebanon-Concrete-Conflicts-of-Interests-1.pdf> (accessed 1 August 2025).
- Bou Akar, H. (2018) *For the war yet to come: planning Beirut's frontiers*. Stanford University Press, Stanford, CA.
- Brenner, N. and C. Schmid (2013) Planetary urbanization. In N. Brenner (ed.), *Implosions/explosions*, Jovis, Berlin.
- Broto, C., A.A. Vanea and E. Rapoport (2012) Interdisciplinary perspectives on urban metabolism. *Journal of Industrial Ecology* 16.6, 851–61.
- Caldeira, T.P.R. (2017) Peripheral urbanization: autoconstruction, transversal logics, and politics in cities of the global South. *Environment and Planning D: Society and Space* 35.1, 3–20.
- Cowan, T. (2024) Urbanization without guarantees: articulation, rentier capitalism and occupancy on the agrarian urban frontier. *Urban Geography* 58.1, 1–24.
- Dabaj, J., C. Boano and H. Al-Harithy (2021) Learning to be a city: emerging practices for housing the displaced in Bar Elias (Lebanon). In H. Al-Harithy (ed.), *Urban recovery: intersecting displacement with post-war reconstruction*, Routledge, London.
- Dabaj, J., A. Rigon and H. Baumann (2020) *Participatory spatial intervention: how can participatory design and a diversity lens help address vulnerabilities in Bar Elias, Lebanon?* CatalyticAction, Beirut.
- Dagher, L.A., J. Hassan, S. Kharroubi, H. Jaafar and I.I. Kassem (2021) Nationwide assessment of water quality in rivers across Lebanon by quantifying fecal indicators densities and profiling antibiotic resistance of *Escherichia coli*. *Antibiotics* 10.7, 6–8.
- Darwish, H. (2024) Bar Elias: hub of Syrian displacement in Lebanon, thriving commercial center. *Asharq Al-Awsat*, 30 January [WWW document]. URL <https://english.aawsat.com/features/4822036-bar-elias-hub-syrian-displacement-lebanon-thriving-commercial-center> (accessed 1 August 2025).
- Darwish, T., A. Shaban, I. Masih, H. Jaafar, I. Jomaa and J.P. Simaika (2021) Sustaining the ecological functions of the Litani River Basin. *International Journal of River Basin Management* 21.1, 1–29.
- Davies, T. (2018) Toxic space and time: slow violence, necropolitics, and petrochemical pollution. *Annals of the American Association of Geographers* 108.6, 1537–53.
- Davies, T. (2022) Slow violence and toxic geographies: 'out of sight' to whom? *Environment and Planning C: Politics and Spaces* 40.2, 409–27.
- Dürr, E. and R. Jaffe (2014) *Pollution*. In D. Nonini (ed.), *A companion to urban anthropology*. Wiley, Chichester.
- Eid-Sabbagh, K. (2023) Wastewater reuse in Lebanon: shedding light on hydro-social politics at multiple scales. *Water Alternatives* 16.2, 606–31.
- Fakhoury, T. (2017) Governance strategies and refugee response: Lebanon in the face of syrian displacement. *International Journal of Middle East Studies* 49.4, 681–700.
- Faour-Klingbeil, D., E.C.D. Todd and V. Kuri (2016) Microbiological quality of ready-to-eat fresh vegetables and their link to food safety environment and handling practices in restaurants. *LWT—Food Science and Technology* 74 (December), 224–33.
- Farah, J. (2023) Assemblages, cosmopolitics and controversies: capturing the territorial and knowledge dimensions of infrastructural politics in Lebanon. *Environment and Planning C: Politics and Spaces* 42.6, 974–99.
- Fawaz, M. (2017) Planning and the refugee crisis: informality as a framework of analysis and reflection. *Planning Theory* 16.1, 99–115.
- Fawaz, M., C. Al-Hage and M. Harb (2022) Unplanned links, unanticipated outcomes: urban refugees in Halba (Lebanon). *Environment and Planning D: Society and Space* 40.3, 486–507.
- Fregonese, S. (2012) Beyond the 'weak state': Hybrid sovereignties in Beirut. *Environment and Planning D: Society and Space* 30.4, 655–674. <https://doi.org/10.1068/d11410>
- Garrard, K. (2019) We made every living thing from water: an interview with Karim Eid-Sabbagh. *Jadaliyya*, 5 February [WWW document]. URL <https://www.jadaliyya.com/Details/38350> (accessed 1 August 2025).
- Gebeily, M. and E. Madi (2024) Syrians in Lebanon fear unprecedented restrictions, deportations. *Reuters*, 29 May [WWW document]. URL <https://www.reuters.com/world/middle-east/syrians-lebanon-fear-unprecedented-restrictions-deportations-2024-05-29/> (accessed 1 August 2025).
- Gidwani, V. (2012) Waste/value. In T. Barnes, J. Peck and E. Sheppard (eds.), *The Wiley-Blackwell companion to economic geography*, Wiley, Hoboken, NJ.
- Gidwani, V. (2013) Six theses on waste, value, and commons. *Social & Cultural Geography* 14.7, 773–83.
- Graham, S. (2010) *Disrupted cities: when infrastructure fails*. Routledge, Oxford.
- Hamadé, K. (2020) Lebanon's food insecurity and the path toward agricultural reform. *Carnegie Middle East Center*, 13 November [WWW document]. URL <https://carnegie-mec.org/2020/11/13/lebanon-s-food-insecurity-and-path-toward-agricultural-reform-pub-83224> (accessed 1 August 2025).
- Harb, M. and S. Atallah (2023) How decentralization efforts have recentralized authority in the Arab region. In A.Ü. Bâli and O.M. Dajani (eds.), *Federalism and decentralization in the contemporary Middle East and North Africa*. ASCL studies in comparative law, Cambridge University Press, Cambridge.
- Helou, M., M. Khalil and R. Husni (2023) The Cholera outbreak in Lebanon: October 2022. *Disaster Medicine and Public Health Preparedness* 17.422, e422.
- Kelly-Reif, K. and S. Wing (2016) Urban-rural exploitation: an underappreciated dimension of environmental injustice. *Journal of Rural Studies* 47, 350–8.
- Kikano, F., G. Fauveaud and G. Lizaralde (2021) Policies of exclusion: the case of Syrian refugees in Lebanon. *Journal of Refugee Studies* 34.1, 422–52.
- Lawson, O. (2024) Organised abandonment in Lebanon's Litani River Basin. *Environment and Planning E: Nature and Space*, Online First. doi: <https://doi.org/10.1177/25148486241291942>.
- Leenders, R. (2012) *Spoils of truce: corruption and state-building in post-war Lebanon*. Cornell University Press, London.
- Liboiron, M. (2021) *Pollution is colonialism*. Duke University Press, Durham and London.
- Liboiron, M., M. Tironi and N. Calvillo (2018) Toxic politics: acting in a permanently polluted world. *Social Studies of Science* 48.3, 331–49.
- Mcheik, M., J. Toufaily, M. Akil, T. Hamieh, M.T.A. Saab, B.H. Hassan and Y. Roupheal (2018) Reuse of treated municipal wastewater under different growing seasons for the spinach production. *American Journal of Analytical Chemistry* 09.10, 482–99.
- Ministry of Environment, Council for Development and Reconstruction and World Bank (2024) Final draft national integrated solid waste management strategy of Lebanon executive summary [WWW document]. URL <https://www.cdr.gov.lb/getmedia/12957a66-0f74-40b3-a6da-d5e273b6eb8f/Draft-National-Integrated>

- Solid-Waste-Management-Strategy_Executive-Summary_EN.pdf.aspx (accessed 1 August 2025).
- Navaro, Y., Z.Ö. Biner, A. von Bieberstein and S. Altuğ (2021) *Reverberations: violence across time and space*. University of Pennsylvania Press, Philadelphia, PA.
- Nixon, R. (2011) *Slow violence and the environmentalism of the poor*. Harvard University Press, Cambridge, MA.
- Nucho, J.R. (2016) *Everyday sectarianism in urban Lebanon: infrastructures, public services and power*. Princeton University Press, Oxford.
- Ortiz, C. (2022) Storytelling otherwise: decolonising storytelling in planning. *Planning Theory* 22.2, 177–200.
- Papanicolaou, K.E. (2024) Mirror images: cinematic and sensory ethnography for landscape and urban studies. In N. Bathla (ed.), *Researching otherwise: pluriversal methodologies for landscape and urban studies*. gta Verlag, Zurich.
- Parreira, C. (2020) The art of not-governing: local politics in postwar Lebanon. PhD dissertation, Stanford University.
- Pasquetti, S. and R. Sanyal (2020) Introduction: global conversations on refuge. In R. Sanyal and S. Pasquetti (eds.), *Displacement: global conversations on refuge*, Manchester University Press, Manchester.
- Public Works Studio (n.d.) Bar Elias refugee camp: the story of a community under threat. *Housing Monitor* [WWW document]. URL <https://housingmonitor.org/barelias/index-en.html> (accessed 1 August 2025).
- Sajadian, C. (2020) The Agrarian question in Lebanon today: a view from a camp in the Bekaa Valley. *Jadaliyya*, 19 August [WWW document]. URL <https://www.jadaliyya.com/Details/41585> (accessed 1 August 2025).
- Sanyal, R. (2017) A no-camp policy: interrogating informal settlements in Lebanon. *Geoforum* 84, 117–25.
- Sanyal, R. (2018) Managing through ad hoc measures: Syrian refugees and the politics of waiting in Lebanon. *Political Geography* 66, 67–75.
- Sender, H. (2021) Young people's perspectives of inequitable urban change in lebanese towns affected by mass displacement. *Regional Science Policy and Practice* 14.2, 293–306.
- Shapiro, N. (2015) Attuning to the chemosphere: domestic formaldehyde, bodily reasoning, and the chemical sublime. *Cultural Anthropology* 30.3, 368–93.
- The Legal Agenda (2016) Interior ministry advisor: Lebanon refugee policy based on set of 'nos' [WWW document]. URL <https://english.legal-agenda.com/interior-ministry-advisor-lebanon-refugee-policy-based-on-set-of-nos/> (accessed 1 August 2025).
- Touhouliotis, V. (2018) Weak seed and a poisoned land: slow violence and the toxic infrastructures of war in south Lebanon. *Environmental Humanities* 10.1, 86–106.
- UNDP (2018) Below the surface: results of a WhatsApp survey of Syrian refugees and host communities in Lebanon [WWW document]. URL <https://reliefweb.int/report/lebanon/below-surface-results-whatsapp-survey-syrian-refugees-and-host-communities-lebanon> (accessed 1 August 2025).
- UNDP, UNHCR, UNICEF and Lebanon Ministry of Environment (2020) Lebanon—state of the environment and future outlook: turning the crises into opportunities [WWW document]. URL <https://www.undp.org/lebanon/publications/lebanon-state-environment-and-future-outlook-turning-crises-opportunities> (accessed 1 August 2025).
- UN-Habitat (2021) State of the lebanese cities: governing sustainable cities beyond municipal boundaries [WWW document]. URL https://unhabitat.org/sites/default/files/2022/03/un-habitat_escwa_state_of_the_lebanese_cities_2021_web.pdf (accessed 1 August 2025).
- UNHCR, UNICEF and WFP (2021) Vulnerability assessment of Syrian refugees in Lebanon [WWW document]. URL <https://reliefweb.int/report/lebanon/vasyr-2020-vulnerability-assessment-syrian-refugees-lebanon> (accessed 1 August 2025).
- Verdeil, E. (2016) Beirut: metropolis of darkness and the politics of urban electricity grid. In A. Luque Ayala and J. Silver (eds.), *Energy, power and protest on the urban grid: geographies of the electric city*, Routledge, London.
- Vohra, A. (2019) Dozens of Syrian refugees evicted in anti-pollution drive. *Al Jazeera*, 27 April [WWW document]. URL <https://www.aljazeera.com/news/2019/4/27/dozens-of-syrian-refugees-evicted-in-lebanon-anti-pollution-drive> (accessed 1 August 2025).
- Wang, C.M., D. Maye and M. Woods (2023) Planetary rural geographies. *Dialogues in Human Geography*, Online First. doi: <https://doi.org/10.1177/20438206231191731>.
- World Bank (2024a) Lebanon poverty and equity assessment 2024: weathering a protracted crisis [WWW document]. URL <https://documents1.worldbank.org/curated/en/099052224104516741/pdf/P1766511325da10a71ab6b1ae97816dd20c.pdf> (accessed 1 August 2025).
- World Bank (2024b) Lebanon interim damage and loss assessment (DaLA) [WWW document]. URL <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099111224112085259/p5063801c62fbc0c21beff1d0a436d07e02> (accessed 13 August 2025).
- Yammine, L. and R. Salame (2024) From flush to crop: Akkar farmers desperate use of raw sewage water. *The Public Source*, 22 May [WWW document]. URL <https://thepublicsource.org/sewage-irrigation-water-akkar> (accessed 1 August 2025).