



Deposited via The University of Sheffield.

White Rose Research Online URL for this paper:

<https://eprints.whiterose.ac.uk/id/eprint/244693/>

Version: Published Version

Article:

Marvin, S. (2026) Illicit cultivation and urban informality: domesticating agritech as atmospheric regulation. Journal of Urban Affairs. ISSN: 0735-2166

<https://doi.org/10.1080/07352166.2026.2661991>

Reuse

This article is distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND) licence. This licence only allows you to download this work and share it with others as long as you credit the authors, but you can't change the article in any way or use it commercially. More information and the full terms of the licence here: <https://creativecommons.org/licenses/>

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.



Illicit cultivation and urban informality: Domesticating agritech as atmospheric regulation

Simon Marvin

To cite this article: Simon Marvin (12 May 2026): Illicit cultivation and urban informality: Domesticating agritech as atmospheric regulation, Journal of Urban Affairs, DOI: [10.1080/07352166.2026.2661991](https://doi.org/10.1080/07352166.2026.2661991)

To link to this article: <https://doi.org/10.1080/07352166.2026.2661991>



© 2026 The Author(s). Published with
license by Taylor & Francis Group, LLC.



Published online: 12 May 2026.



Submit your article to this journal [↗](#)



Article views: 217



View related articles [↗](#)



View Crossmark data [↗](#)

Illicit cultivation and urban informality: Domesticating agritech as atmospheric regulation

Simon Marvin ^{a,b}

^aUniversity of Sheffield; ^bUniversity of Sydney

ABSTRACT

This paper examines illicit domestic cannabis cultivation as a form of urban infrastructural adaptation and informal atmospheric regulation. It introduces the concept of domesticating agritech to describe how cultivation technologies are repurposed within ordinary dwellings to produce controlled microclimates for plant growth. Clandestine home cultivation involves covertly transforming residential space into climate-controlled agronomic infrastructure, integrating LED lighting, hydroponic systems, and automated environmental controls. Operating in legal gray zones, these practices bypass formal agricultural and planning regulations while reconfiguring housing as decentralized sites of production. The result is a distributed form of urban agronomy in which households actively modulate indoor climates to sustain illicit crops while minimizing detection. Engaging debates on urban informality and infrastructure, the paper shows how these practices reshape domestic space, intensify energy use, and complicate regimes of urban governance and regulatory visibility. It argues that illicit cultivation reveals a wider process through which atmospheric control is being internalized within the home, extending the infrastructuralization of climate into everyday urban life.

KEYWORDS

Urban informality;
domesticating agritech;
atmospheric regulation;
domestic space; cannabis
cultivation; urban
infrastructure

Introduction

Across many Western cities, the quiet proliferation of indoor cannabis cultivation has reshaped how urban domestic space is used, sensed, and governed. Previously associated with remote rural landscapes and countercultural economies, cannabis growing increasingly occurs within homes, apartments, and ordinary suburban units. These interiors host a growing array of technologies more commonly associated with smart agriculture, including LED lighting, hydroponic systems, and automated climate controls, that sustain photosynthetic life behind closed doors. In urban contexts, this has meant repurposing ordinary dwellings as clandestine agricultural systems. Decorte and Potter (2015) describe this as a form of technologically mediated import substitution, in which globally circulating cultivation knowledge is absorbed into localized domestic practice. In the United Kingdom, for example, Kirby and Peal (2015) found that most detected cannabis farms were located in ordinary residential premises.

While prior research has documented the prevalence and risks of domestic cultivation, its infrastructural and atmospheric implications have received little sustained attention. These transformations are technical and economic adaptations, and they also signal a broader socio-material reorganization of urban life. It is in this context that the paper develops the concept of *domesticating agritech* to analyze how illicit, climate-controlled cultivation systems reconfigure urban domestic space. Domesticating is used in its double sense of bringing agricultural technology into the home

CONTACT Simon Marvin  s.marvin@sheffield.ac.uk  Urban Institute, University of Sheffield, ICOS, 219 Portobello, Sheffield S1 4DP, UK.

© 2026 The Author(s). Published with license by Taylor & Francis Group, LLC.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

and repurposing it for everyday use. Defined as the informal adaptation and embedding of controlled-environment agricultural technologies within domestic settings, domesticating agritech highlights how ordinary residences are re-engineered to produce and regulate microclimates beyond the bounds of legality or formal planning. This builds on earlier work on controlled environments and microclimatic enclosure, which has traced how urban climates are increasingly engineered and internalized within built environments (Marvin & Rutherford, 2018; Marvin et al., 2023) but extends this analysis into informal and illicit domestic settings. This exposes how urban informality increasingly operates through the manipulation of infrastructural and atmospheric conditions within the home. The paper treats domesticating agritech as the primary concept, informal atmospheric regulation as the analytical lens, and illicit cultivation as the empirical site through which these dynamics are examined.

The analysis builds on three sets of literature. First, urban political ecology (Heynen et al., 2006; Swyngedouw, 2004) reveals how cities depend on metabolic flows of energy, water, and air. Illicit indoor cultivation participates in these metabolisms by drawing on and disguising its use of urban infrastructures. Second, infrastructure studies and urban STS (Anand, 2017; Larkin, 2013; Simone, 2004) show how infrastructures are relational and open to hacking, retrofitting, and informal use. Grow houses exemplify this improvisational quality as housing stock becomes agricultural equipment and the power grid becomes both a resource and a risk. Third, work on atmospheric governance (Adey, 2013; Choy, 2018) highlights how air and climate have become political objects, subject to monitoring, management, and contestation. Domestic cannabis production demonstrates these processes through informal microclimatic practices.

While these literatures provide important insights into urban metabolism, infrastructure and atmospheric governance, they do not adequately explain how environmental control is relocated into domestic space through informal, small-scale and often illicit practices. This paper therefore departs from these literatures in three ways. First, it shifts the analytical focus from large-scale or institutional infrastructures to the domestic interior as a site of infrastructural transformation. Second, it reconceptualizes informality as operating through the modulation of environmental conditions rather than solely through spatial or economic arrangements. Third, it reframes atmospheric governance by foregrounding vernacular, small-scale and often illicit practices of microclimatic control. It is through this reframing that the concept of domesticating agritech is developed to link these dynamics.

The paper uses illicit cultivation as a strategic case to analyze, in conjunction, the dynamics of urbanization, infrastructural hacking and environmental modulation. Methodologically, the paper synthesizes secondary and documentary sources from jurisdictions where indoor cultivation has been documented, particularly Australia, Belgium, Canada, New Zealand, the UK, and the U.S. (Belackova et al., 2019; Decorte, 2010; Hakkarainen et al., 2015; Potter & Klein, 2020; Shim et al., 2023). The aim is to develop a conceptual vocabulary for examining how illicit cultivation participates in urban infrastructural and climatic systems. This approach reflects the challenges of studying covert and illicit practices, which are difficult to observe directly, and instead adopts a comparative and synthetic strategy to identify socio-technical patterns across cases.

The paper makes three specific contributions. First, it reframes illicit domestic cannabis cultivation as a form of informal infrastructural adaptation, demonstrating how urban housing and energy systems are reconfigured for covert productive use. Second, it develops the concept of domesticating agritech to capture the migration and transformation of controlled-environment agricultural technologies within domestic settings. Third, it advances the notion of informal atmospheric regulation to conceptualize how environmental conditions are continuously modulated at the micro-scale of the home under conditions of legal ambiguity.

The paper's argument is structured as follows. It begins by tracing the urbanisation of covert cannabis cultivation, showing how production has shifted from rural margins into domestic interiors. It then develops the concept of domesticating agritech to explain how controlled-environment technologies are informally embedded within housing and infrastructure. The analysis then examines the legal and regulatory gray zones that enable these practices to persist, before situating grow houses within wider debates on urban atmospheric regulation. The paper concludes by reflecting on how

these dynamics reposition the home as a key site within contemporary environmental governance, and what this reveals about the intersections of informality, technology, and atmospheric control in urban life.

The urbanization of covert cultivation

This section situates the rise of domestic cannabis cultivation within broader patterns of urban transformation. It traces how covert growing practices have migrated from peripheral rural zones into the urban domestic sphere, reshaping the socio-technical landscape of housing and infrastructure. Grounding this development empirically and conceptually highlights how the city has become a central terrain for the reconfiguration of illicit agronomic practice.

The relocation of small-scale cannabis cultivation from rural margins to urban interiors represents a reconfiguration of agricultural geography. In many post-industrial cities, notably in Belgium, Canada, New Zealand and the United Kingdom, the combination of affordable technology, partial legalization and uneven enforcement has encouraged a shift from dispersed outdoor growing to discreet indoor environments (Belackova et al., 2019; Decorte, 2010; Potter & Klein, 2020; Shim et al., 2023). In the UK context, cannabis cultivation has become embedded within ordinary housing stock, with the majority of detected sites located in residential settings (Kirby & Peal, 2015). This movement intensifies older patterns in which homes and workshops have long served as hybrid spaces of production. Yet contemporary iterations are distinctive in their technical sophistication, reliance on urban infrastructures and atmospheric enclosure. Several structural drivers underpin this urbanization.

First, changes in the regimes of visibility and policing have altered the geography of risk. The expansion of aerial surveillance, satellite imaging and rural eradication programs has rendered outdoor plantations increasingly vulnerable (Hudson, 2020). Urban space, by contrast, offers a dense fabric of concealment, with regularized energy consumption, visual anonymity and proximity to utilities. The city thus becomes a camouflage, allowing illicit cultivation to operate within the ordinary rhythms of domestic life.

Second, technological miniaturization and market diffusion have democratized access to controlled-environment systems. Equipment like LED grow lights, hydroponic pumps, and digital sensors that were once confined to commercial greenhouses or research labs are now inexpensive consumer goods. Online forums and social media tutorials circulate technical know-how, enabling individuals with minimal expertise to retrofit apartments, garages, and spare rooms for cultivation. In these interiors, growing becomes a form of infrastructural improvisation as electricity lines are rerouted, ventilation ducts repurposed, and windows sealed to create synthetic ecologies. These retrofits exemplify what urban infrastructure studies describe as hacking involving the informal reconfiguration of existing systems to serve alternative ends (Larkin, 2013; Simone, 2004). Cultivation has shifted away from large-scale commercial sites toward dispersed residential settings, becoming more urban, domestic and technologically intensive (Decorte & Potter, 2015; Kirby & Peal, 2015; Potter et al., 2015).

Third, legal ambiguity has generated a landscape of partial tolerance. In Canada, for example, medical-use exemptions before full legalization produced gray zones in which household growers operated semi-legally (Shim et al., 2023). In the UK, enforcement discretion and uneven policing across neighborhoods have created differential hierarchies of risk (Potter & Klein, 2020). Similar ambiguities appear in Belgium's personal-use grow allowances (Decorte, 2010) and New Zealand's deprioritization of small-scale possession (Belackova et al., 2019). These cases show that urban informality in the Global North often arises not from a total absence of regulation but from its fragmentation. This is what Roy (2005) terms gray space constituting zones where legality and illegality intertwine through discretion, tolerance and selective visibility. While Roy conceptualizes gray space primarily in relation to planning and development regimes, this paper extends the notion to the environmental modulation of domestic interiors.

Fourth, urban housing markets mediate this process. Vacant or under-let dwellings in declining suburbs, sub-leased apartments and informal rental arrangements provide accessible sites for conversion. In overheated housing markets, inflated short-term rents may incentivize landlords to disregard modifications. The domestic sphere thus becomes simultaneously a home, a workshop, and a climate laboratory. These practices do not entirely sever the traditional link between dwelling and reproduction but overlay it with a secondary logic of production and risk management.

Fifth, urban energy and data infrastructures play a central role. High-intensity lighting and environmental control systems dramatically increase electricity demand, while smart-meter data and thermal anomalies provide new forms of algorithmic legibility to enforcement agencies (Kitchin, 2014). Growers respond with tactics of evasion, such as diverting circuits, staggering usage, or distributing operations across multiple sites, to remain indistinguishable from standard household consumption patterns. In this sense, covert cultivation is co-produced with the very infrastructures that might expose it.

While existing drug policy research documents these shifts empirically (Decorte & Potter, 2015; Potter & Klein, 2020), that literature is less developed in its analysis of their infrastructural and atmospheric significance. The reframing proposed here treats these developments as informal reconfigurations of urban infrastructure. Seen together, these dynamics reposition illicit cultivation within the city's metabolism. It depends on formal networks of energy, housing, and information, even as it operates informally through them, blurring conventional binaries between legal and illegal, home and farm, and domestic privacy and infrastructural exposure. Urban cultivation is therefore a mirror of the city's broader capacity to absorb and conceal production as a phenomenon that is increasingly urban, domestic, and technologically intensive. Understanding this as domesticating agritech focuses on the informal embedding of climate-control systems within residential space. It connects empirical observations of grow houses to larger questions of urban informality and environmental governance. The following section elaborates on this concept, showing how the retrofitting of housing stock and the hacking of infrastructure together constitute a distinctive socio-technical practice through which urban atmospheres are engineered and regulated from below.

Domesticating agritech: Infrastructural hacking and domestic retrofit

This section develops the core concept of domesticating agritech to examine how illicit cultivation retools urban domestic space through informal technological adaptation. While existing literature gestures toward these dynamics, they do not fully capture this process. Building on infrastructural theory and urban political ecology, the section specifies its spatial, technical, and regulatory dimensions.

Dispersed growth interiors depend on a shared socio-technical logic that involves the informal adaptation and incorporation of controlled-environment agricultural systems into homes. The process of domesticating agritech combines the dual senses of bringing technologies into the home and taming them for ordinary use. The concept captures how the technical infrastructures of climate-controlled agriculture are absorbed into residential architecture, improvised through ad hoc design, and operated in conditions of partial legality. This process operates through three intertwined dimensions:

1. Spatial: The relocation of cultivation from specialized rural or industrial sites into domestic interiors. This is a spatial reconfiguration in which spare rooms, garages, and basements are converted into productive spaces, and so altering the social and material meanings of the dwelling.
2. Technical: The re-use and modification of household infrastructures (electricity, ventilation, water, data) to construct enclosed ecologies. Domestic piping becomes irrigation, HVAC ducting becomes a concealment system, and sensors and timers orchestrate an automated microclimate.

3. Governance: The negotiation of legal and infrastructural gray zones. Domesticating agritech exploits tolerances in building codes, rental contracts, and policing thresholds, operating within the gray space of zones that are simultaneously inside and outside the law.

This framing of domestication moves beyond a descriptive account of home growing to show how informal cultivation is a vernacular mode of infrastructural production, consistent with the improvisational practices long associated with urban informality (McFarlane, 2012; Simone, 2004). In effect, these dispersed grow-ops constitute a decentralized agronomic order of a distributed yet interconnected system of environmental control operating beyond formal oversight (Decorte & Potter, 2015).

The paper brings three bodies of work into a productive tension to reconceptualize illicit domestic cultivation as a form of infrastructural and atmospheric production. Urban political ecology, infrastructure studies and atmospheric governance each illuminate partial aspects of this phenomenon, but none alone captures its domestic, informal and microclimatic specificity. Taken together, they enable the development of the concept of domesticating agritech as a distinct socio-technical formation. First, urban political ecology and infrastructure studies provide an urban-metabolic view (Heynen et al., 2006; Swyngedouw, 2004), showing that grow houses function as metabolic nodes that convert electricity, water, and chemical nutrients into plant biomass. They externalize heat and odor while internalizing light and humidity, re-routing flows that ordinarily sustain domestic comfort. Second, an infrastructure-as-practice lens (Anand, 2017; Larkin, 2013) underscores the mutability of systems under everyday improvisation. Residents act as vernacular engineers, exploiting latent affordances in housing stock and grid connections. The term *hacking* is apt because it conveys the situated technical creativity that manipulates the seams of formal systems. Finally, from the perspective of atmospheric governance (Adey, 2013; Choy, 2018; Fletcher, 2010), domesticating agritech represents an inversion of top-down climate management. Whereas environmental regulation typically targets emissions or building efficiency, these growers regulate air temperature, humidity and chemical composition at the micro-scale. For this reason, these practices are referred to as informal atmospheric regulation, reserving governance for institutional oversight. Each of these perspectives illuminates a different dimension of the problem, articulating how illicit domestic cultivation can be understood as infrastructural production at the micro-scale.

From domestic space to atmospheric device

Domesticating agritech entails a radical repurposing of domestic architecture. Typical retrofits include sealed windows, insulated walls, waterproofed floors and extensive cabling for lights and pumps. Carbon filters, duct fans and dehumidifiers orchestrate the invisible work of climate maintenance. Illicit cultivators carefully calibrate airflow, temperature and humidity using relatively inexpensive and widely available technologies to sustain hidden microclimates within domestic space (Potter & Klein, 2020). The domestic interior effectively becomes a photosynthetic machine in which air, water and light are continuously modulated to support plant growth. These adjustments represent a form of atmospheric labor as growers monitor sensors, adjust nutrients and maintain equilibrium while concealing odor and heat to avoid detection. This formulation extends and repositions existing work on atmospheric governance (Adey, 2013; Choy, 2018; Marvin & Rutherford, 2018; Marvin et al., 2023). While most accounts focus on state-led, corporate or urban-scale interventions in air and climate, the analysis here shifts attention to illicit, small-scale and domestic practices of atmospheric control. In doing so, it identifies a form of vernacular atmospheric regulation that operates below the threshold of formal governance yet remains deeply entangled with it.

Energy consumption is a key infrastructure resource, as high-wattage lights and HVAC systems push electricity use far beyond normal household levels. To limit their visibility, many growers adopt energy-efficient LED lighting and recirculating hydroponic systems to reduce costs and minimize telltale heat and power signatures (Kirby & Peal, 2015). These adaptations constitute what might be called clandestine sustainability constituted by the capacity of illicit domestic systems to achieve efficiency and resilience

precisely under conditions of legal risk and concealment. Clandestine sustainability operates as a site of contradiction, where environmentally conscious practice is entangled with concealment from the very governance structures that nominally promote green living. Yet not all responses are oriented to efficiency as some cultivators resort to more covert tactics to bypass electricity meters, stagger usage, or spread operations across multiple properties to obscure unusual consumption patterns. In this way, the city's energy grid becomes both the enabler of cultivation and a potential snare, as its data streams can betray the very behaviors they support (Kitchin, 2014).

Domesticity and informality

Revisiting the category of the domestic sphere situates these practices within broader debates about home and production. As Blunt and Dowling (2006) and Brickell (2012) argue, the house has always been a politicized, productive space rather than a purely private retreat. Historical forms of cottage industry, care work and repair similarly blurred the line between livelihood and living. Domesticating agritech extends this lineage through technological intensification and judicial ambiguity. What distinguishes contemporary grow houses is partly their merging of home and production, and partly the infrastructures of climate control and energy abstraction that embed the politics of environment and surveillance within the dwelling. Seen in this light, illicit domestic cultivation exemplifies what Chiodelli et al. (2018) call the centrality of the illegal to governance. It reveals how states tolerate or instrumentalize illegality to manage risk and maintain flexibility. Grow houses persist because of these discretionary gaps, positioning domestic agritech into a broader economy of tolerated illegality that characterizes urban informality in the Global North.

The politics of infrastructural hacking

Each act of retrofitting or bypassing participates in what Simone (2004) terms “people-as-infrastructure” through the creation of improvised technical and social relations. Domesticating agritech materializes this insight by turning walls and circuits into instruments of metabolic production. It is an invisible infrastructure, usually unnoticed until failures reveal it through electrical fires or police raids. Such moments of breakdown render visible the otherwise hidden coupling between domestic life and the city's network systems. They also introduce new forms of inequality and exposure. Algorithmic detection technologies are unevenly deployed across neighborhoods and often reinforce racialized geographies of suspicion (Hudson, 2020). The governance of illicit cultivation thus mirrors broader patterns of infrastructural injustice, in which those with resources can buffer themselves against risk through insulation, redundancy, or legal aid. At the same time, precarious tenants and marginalized communities bear the brunt of surveillance and enforcement. This paper distinguishes between governance involving institutional oversight by state or corporate actors and regulation through vernacular modulation of environmental conditions within the home. Growers engage in regulation as they calibrate temperature, light, and humidity within a framework shaped by distant governance systems, such as energy markets, zoning codes, and policing algorithms. This clarification aligns domesticating agritech with the broader field of environmental governmentality (Agrawal, 2005; cf. Fletcher, 2010).

Understanding illicit grow houses as atmospheric devices connects them to a continuum of urban climate control, from HVAC systems in offices to smart thermostats. What distinguishes informal cultivation is its precarious ingenuity as it is assembled from consumer-grade components, powered through contested circuits, and sustained by tacit skill. These makeshift microclimates expose a broader urban condition of unevenly distributed and differentially policed engineered atmospheres. Taking this perspective, domesticating agritech becomes an analytical vantage point (rather than a marginal curiosity) for exploring how environmental control becomes embedded in everyday infrastructures. The home emerges as a frontier of environmental politics, where atmospheric regulation is negotiated between technological aspiration, economic necessity and legal precarity.

Gray zones of informality

This section focuses on the legal and regulatory ambiguities that enable domestic cultivation to persist. It analyses the discretionary enforcement, housing dynamics, and algorithmic surveillance that structure the gray zones in which these practices unfold. And then examines spatial differentiation in legality, the politics of visibility, and the state's role in co-producing informal practices of environmental control.

The proliferation of domestic agritech unfolds within a fragmented legal and regulatory environment that is a spectrum of tolerance rather than a binary of legal versus illegal. In many Global North cities (Auckland, London, Toronto, etc.), cannabis cultivation has moved into what Roy (2005) terms “gray space.” These zones are neither fully sanctioned nor explicitly prohibited, and where the state exercises discretion through selective enforcement and ambiguity (Belackova et al., 2019; Chiodelli et al., 2018).

As cannabis policy experiments diversify globally, this informal domestic growing can be seen as part of an ongoing experiment in balancing public health, personal freedom, and market control (Kilmer and Pacula, 2017). Within this evolving landscape, semi-legal home cultivation persists as a critical middle ground as a vernacular infrastructure that both evades formal regulation and responds to local demand. In practice, these informal infrastructures are often stabilizing because most household cultivators are neither organized criminals nor deviant outsiders (Potter & Klein, 2020). Instead, they are typically small-scale household cultivators who manage risk through everyday routines, growing only a few plants in spare bedrooms or lofts to minimize visibility to both law enforcement and criminal groups (Potter & Klein, 2020). This reframes illicit cultivation as a form of infrastructural self-provisioning by tuning domestic atmospheres to sustain plant life while minimizing visibility and risk.

Legality as spatial differentiation

Partial legalization, medical exemptions, and personal-use allowances have created a patchwork of legal categories that vary across jurisdictions and even within neighborhoods. In Canada, for example, small-scale household cultivation became fully legal only after years of ambiguous medical licensing, leaving a residual culture of tolerated informality (Shim et al., 2023). In the UK and Belgium, for personal use clauses and uneven policing create de facto permissive zones (Decorte, 2010; Potter & Klein, 2020). Enforcement is often mediated by housing tenure, class and race, where suburban homeowners caught growing may receive warnings, whereas tenants in precarious rentals face criminalization or eviction. This differentiation exemplifies the spatialization of illegality, as evidenced by the uneven organization of tolerance and punishment across urban space (Hudson, 2020). As Heyman's (1999) *States and Illegal Practices* collection emphasizes, illegality is not the opposite of governance but one of its instruments, since law's selective application generates flexibility, informality and opportunity. Domesticating agritech, accordingly, exists within the state's discretionary architecture, exploiting uncertainty as a condition of its material possibility.

The governance of opacity

Managing illicit cultivation focuses on regulating conditions of visibility. Utility companies and police agencies increasingly use smart-meter analytics, thermal imaging and data cross-referencing to detect anomalous energy signatures. This is a form of what Kitchin (2014) terms “algorithmic governance,” in which statistical deviance substitutes for direct evidence. Yet such techniques are not uniformly applied as local authorities often prioritize surveillance in neighborhoods already marked as risky or disorderly, thereby reproducing existing social and racial biases (Alexander, 2010; Ancrum & Treadwell, 2016; Hudson, 2014). Growers deploy concealment measures, such as masking odors with air-fresheners or carbon filters, to blend into the backdrop of everyday life. The home becomes a site of cat-and-mouse between concealment and detection, where atmospheric tactics continuously

evolve to foil increasingly data-driven enforcement. The illicit retrofit thus reveals governance as an adaptive relation between state infrastructure and citizen improvisation.

Informality as state relation

Urban informality is often seen as a symptom of state absence, as evidenced by unregulated housing, unplanned settlements, and extralegal economies. However, as McFarlane (2012) and Van Schendel and Abraham (2005) argue, informality is produced through interaction with the state rather than apart from it. Domesticating agritech exemplifies this relational quality. Growers depend on material and institutional infrastructures of the formal city, including electricity grids, housing codes, and tenancy laws, even as they subvert their intended uses. The informal is therefore co-constitutive with the formal, as both evolve together through improvisation, tolerance and selective enforcement. In Northern cities, informal practices around energy, housing and data now mirror the tactical creativity associated with Southern urbanism (Simone, 2004). The distinctive twist in this case is the atmospheric dimension with informality operating through the regulation of air (heat, humidity, odor). This micro-scale modulation makes domestic atmospheres newly legible to governance and newly vulnerable to surveillance.

From illegality to informal atmospheric regulation

Framing grow houses as atmospheric infrastructures highlights a shift from governing people or property to governing conditions. The detection of smell, heat and condensation turns the air itself into both evidence and battleground. Polson (2019) notes that environmental governance increasingly operates through technical measurements of air and energy, and domestic cultivation extends this logic downward into the household. The illicit atmosphere serves as an interface between everyday life and regulatory systems managed by both growers and the state, though for opposing ends. Growers' actions are better conceived as informal atmospheric regulation, consisting of continuous adjustments to environmental parameters within constraints set by larger regulatory regimes and infrastructure. The governance of illicit cultivation, by contrast, is operationalized through the design of energy-monitoring systems, building codes and risk algorithms. These two scales meet in the domestic interior, producing a dense field of negotiation and adaptation.

Re-situating illicit cultivation within gray zones of informality refines how urban studies conceptualize the politics of legality. It shows that informality is a normalized mode of urbanization. Chioldelli et al. (2018) suggest that the illicit and the illegal are indispensable to the everyday functioning of governance, and this case demonstrates that principle at the level of domestic infrastructure. The grow house is at once dependent on and disruptive of the city's metabolic systems. By treating air as a contested object, the analysis extends debates on informal infrastructure into the atmospheric domain. The following section shifts from these legal and regulatory conditions to examine how such dynamics are materially enacted through everyday practices of microclimatic control within the home.

Domestic microclimatic regulation

This section argues that domestic cannabis cultivation constitutes a form of *vernacular atmospheric regulation*. It examines how illicit growers develop sophisticated environmental management practices under constrained, often precarious domestic conditions. This reframes illicit cultivation as an emergent urban response to legal, environmental, and infrastructural uncertainty. In doing so, it extends existing work on controlled environments and the urbanization of climate control (Marvin & Rutherford, 2018; Marvin et al., 2023) by demonstrating how these processes are internalized within informal and illicit domestic infrastructures.

Domestic cultivation operates through a distinctive mode of practice that can be understood as informal atmospheric regulation. This refers to the continuous, technically mediated modulation of environmental conditions within domestic space amid legal ambiguity. Grow houses become key sites of

informal atmospheric regulation in self-directed, technically mediated interventions that reconfigure the air of domestic life into a three-fold managed cultivation medium. First, air refers to the material medium itself, its chemical composition, and its movement. Second, climate denotes the aggregated, statistical behavior of the atmosphere over time, often treated as a system subject to policy. And third, atmosphere captures both the physical and affective qualities of air as a lived environment (following Adey, 2013; Choy, 2018). These distinctions matter because indoor cultivation engages all three as growers engineer the air's properties, stabilize microclimates and construct sealed, and artificially temperate atmospheres that blend technical precision with embodied labor. Existing atmospheric scholarship tends to focus on urban-scale governance or affective environments, whereas the emphasis here shifts to illicit microclimatic engineering within ordinary housing. The home thus becomes a climatic apparatus, with its walls and technology performing the work once done by weather.

The routines of domestic cultivation, including timing lights, circulating air, and calibrating humidity, mirror the logics of formal environmental management. These practices exemplify what Fletcher (2010) calls environmentality through the governance of conduct through environmental means. Here, that dynamic is inverted as growers govern not others but themselves through the medium of air. Their regulation of atmosphere is both autonomous and reactive, responding to infrastructural constraints, surveillance risks, and plant physiology rather than to policy directives. Such modulation is highly data dependent. Digital sensors log temperature and pH, timers synchronize light cycles, and online forums exchange recipes for optimal growth. In this sense, domestic agritech internalizes the rationalities of smart environments through feedback, optimization, and continuous adjustment (Gabrys, 2014). The key difference is illegality, as these systems operate outside regulatory oversight, turning ordinary housing stock into experimental climate labs that quietly intersect with formal energy networks.

Urban atmospheric regulation has long been a feature of modern life, from building ventilation and heating to air-pollution controls (Shove, 2003). What is new is the redistribution of climatic agency into the hands of the informal. Home growers use the same electrical, ventilation, and data circuits that enable corporate and state climate control, but they do so tactically and under constraint. Their interventions highlight how governance today often operates through conditions rather than direct commands, modulating flows of air, energy, and information. Polson (2019) observes that cannabis policy increasingly intersects with environmental policy, particularly around energy use and pollution. Domestic cultivation extends this entanglement downward, embedding environmental politics in the household. Every decision about airflow or insulation becomes simultaneously ecological and judicial balancing plant health with the risk of detection. The atmosphere emerges as a juridical-ecological medium in which state oversight and personal improvisation meet.

Because illicit microclimates generate heat and smell, they produce new forms of legibility. Atmospheric traces, such as heat, humidity and odor, become legible to data-driven governance systems. In response, growers cultivate opacity by venting heat through chimneys and dispersing equipment across rooms to remain indistinguishable from normative domestic life. Such tactics form a kind of counter-environmentality constituted through a continual negotiation between concealment and exposure in which the atmosphere itself becomes the site of struggle. This dynamic is uneven. The capacity to manipulate or conceal atmospheric signatures depends on resources, with access to better equipment and more secure tenure providing protection, thereby mirroring broader inequities in infrastructural access. In this way, domesticating agritech reproduces, rather than transcends, the stratifications of urban climate politics.

Illicit indoor cultivation carries significant energy and material costs (Butsic & Brenner, 2016). Each mature cannabis plant has been estimated to consume as much electricity as several refrigerators (Mills, 2012). However, because these operations are unpermitted, their impacts remain statistically invisible to urban sustainability metrics. This invisibility exemplifies a paradox of environmental governance with intensive forms of climate control proliferating precisely where formal oversight is weakest. Politically, informal atmospheric regulation complicates the moral geography of sustainability. It blurs distinctions between deviant and innovative practices, revealing how techniques of

environmental management circulate between licit and illicit domains. Domesticating agritech is neither purely oppositional nor fully assimilated because it is parasitic on formal infrastructures, drawing power and knowledge while evading control. It shows that the capacity to engineer atmosphere is a distributed (and often clandestine) urban practice.

Viewing the home as an atmospheric device extends debates on urban informality into the realm of everyday environmental governance. As Adey (2013) notes, modern cities are defined by their management of air, whether through pollution laws, HVAC design or disaster response. When domestic spaces become sites of microclimatic experimentation, they become part of this wider politics. The residents who hack ventilation ducts or tune humidity sensors are not outside governance, but are performing it differently as improvised climatic citizens negotiating survival, legality, and metabolic flow. Consequently, the atmosphere is emerging as a critical terrain of urban politics. Domesticating agritech makes this terrain visible, revealing how climate control, legality and informality now converge within the most intimate spaces of the city.

Conclusion

This paper has argued that illicit domestic cannabis cultivation should not be understood as a marginal or solely criminological phenomenon, but as a form of informal infrastructural and atmospheric production embedded within the urban fabric. Through the concept of domesticating agritech, it has shown how the home is re-engineered as a site of microclimatic control, extending the terrain of urban governance into the intimate domain of domestic space. Recasting these practices as informal atmospheric regulation links illicit cultivation directly to broader debates on urban governance and informality, as home growers operate through the same grids, ventilation networks and data infrastructures that underpin formal environmental management. In this way, their actions illuminate the relational character of informality and a reworking of its terms within the domestic sphere. The illicit home becomes an interface between infrastructural dependence and political invisibility, as well as between the aspiration to control climate and the necessity of concealment.

Three implications follow from this analysis. First, the study repositions urban informality as an ambient phenomenon. Beyond informal housing or service provisioning, informality now occurs through the modulation of environmental conditions, specifically, how air, temperature and energy are manipulated within homes and micro-infrastructures. Second, it reframes the atmosphere as an emerging medium of urban governance, where air is a contested domain through which legality, surveillance, and environmental policy are negotiated. Third, it highlights the domestic interior as a critical site of infrastructural politics. The home, once idealized as a private refuge, is revealed as a laboratory for both technological innovation and regulatory evasion, which is part of what Heynen et al. (2006) call the metabolic urban fabric.

Together these implications focus on vernacular climate engineering as a mode of urban practice and expose the uneven ways in which environmental governance reaches into intimate spaces. Domesticating agritech thus joins a broader landscape of improvised climate infrastructures ranging from DIY air filters to home energy storage systems, through which citizens engage, resist or replicate the logics of formal environmental control. The analysis also has implications for drug policy debates. Rather than eliminating cannabis production, prohibitionist regimes have largely embedded it within the hidden circuits of the city. Forces beyond formal policy, including technological innovation, cultural practices and informal social networks, are driving the global spread of domestic cultivation (Decorte & Potter, 2015; Potter & Wells, 2021). Unregulated grow rooms create their own hazards even as they meet local demand. The domestic cannabis greenhouse thus stands as both a symptom of prohibitive policy and a prototype of alternative, localized environmental governance taking shape inside the home.

At the same time, this analysis recognizes its limits. The argument here is primarily conceptual and synthetic, drawing on comparative secondary evidence from the Global North rather than new fieldwork. Future research could pursue several directions. First, comparative urban geographies of indoor cultivation might trace how legality, energy costs and housing form shape these practices across

different cities. Second, environmental and energy accounting could examine how informal cultivation contributes to urban carbon footprints and complicates efforts to meet sustainability targets. Third, ethnographic approaches to domestic climate-making could explore how residents themselves experience and justify their participation in illicit or semi-legal atmospheric economies.

Urban governance is shifting from planning codes and zoning instruments to the modulation of the environments that sustain life itself. The study of illicit cultivation thus provides a lens onto the broader urbanization of atmosphere and the process by which air itself becomes a site of regulation, contestation and everyday technological creativity. Recognizing this allows urban studies to grasp more precisely how the politics of informality, energy, and environment now converge within the most ordinary spaces of the city—and how atmospheric control itself is becoming a central terrain of urban governance.

Acknowledgments

Many thanks to those who generously shared their experiences and insights into domestic cultivation practices. Their interest in and enthusiasm for constructing technically mediated microclimates informed this paper. I also acknowledge the support of colleagues in Paris, Sheffield, and Sydney through ongoing collaborations and discussions. I am grateful to the two anonymous reviewers for their insightful and constructive comments, which significantly improved the paper. Any remaining deficiencies are my own.

Disclosure statement

No potential conflict of interest was reported by the author(s).

About the author

Simon Marvin is an emeritus professor at the University of Sheffield's Urban Institute and honorary professor in the University of Sydney's School of Architecture, Design and Planning. His research examines the changing relations between infrastructure and urban life, with a focus on emerging technologies, environmental governance, and the reconfiguration of urban space. He is the co-author (with Andrés Luque-Ayala) of *Urban Operating Systems: Producing the Computational City* (MIT Press, 2020). His recent work focuses on interior climate control, urban AI and robotics, and the urbanization of neurotechnology.

ORCID

Simon Marvin  <http://orcid.org/0000-0001-5538-5102>

References

- Adey, P. (2013). Air/atmospheres of the megacity. *Theory Culture and Society*, 30(7–8), 291–308. <https://doi.org/10.1177/0263276413501541>
- Agrawal, A. (2005). *Environmentality: Technologies of government and the making of subjects*. Duke University Press.
- Alexander, M. (2010). *The new Jim Crow: Mass incarceration in the age of colorblindness*. The New Press.
- Anand, N. (2017). *Hydraulic city: Water and the infrastructures of citizenship in Mumbai*. Duke University Press.
- Ancrum, C., & Treadwell, J. (2016). Beyond ghosts, gangs and good sorts: Commercial cannabis cultivation and illicit enterprise in England's disadvantaged inner cities. *Crime, Media, Culture: An International Journal*, 13(1), 69–84. <https://doi.org/10.1177/1741659016646414>
- Belackova, V., Roubalova Stefunkova, M., & van de Ven, K. (2019). Overview of “home” cultivation policies and the case for community-based cannabis supply. *International Journal of Drug Policy*, 71, 36–46. <https://doi.org/10.1016/j.drugpo.2019.05.021>
- Blunt, A., & Dowling, R. (2006). *Home*. Routledge.
- Brickell, K. (2012). Geopolitics of home. *Geography Compass*, 6(10), 575–588. <https://doi.org/10.1111/j.1749-8198.2012.00511.x>

- Butsic, V., & Brenner, J. C. (2016). Cannabis (*Cannabis sativa* or *C. indica*) agriculture and the environment: A systematic, spatially-explicit survey and potential impacts. *Environmental Research Letters*, 11(4), 044023. <https://doi.org/10.1088/1748-9326/11/4/044023>
- Chiodelli, F., Hall, T., & Hudson, R. (2018). *The illicit and illegal in regional and urban governance and development corrupt places*. Routledge.
- Choy, T. (2018). Distribution. In C. Howe & A. Pandian (Eds.), *Anthropocene unseen: A lexicon* (pp. 105–109). Punctum Books.
- Decorte, T. (2010). Small-scale domestic cannabis cultivation: An anonymous web survey among 659 cannabis cultivators in Belgium. *Contemporary Drug Problems*, 37(2), 341–370. <https://doi.org/10.1177/009145091003700208>
- Decorte, T., & Potter, G. R. (2015). The globalisation of cannabis cultivation: A growing challenge. *International Journal of Drug Policy*, 26(3), 221–225. <https://doi.org/10.1016/j.drugpo.2014.12.011>
- Fletcher, R. (2010). Neoliberal environmentalism: Towards a poststructuralist political ecology of the conservation debate. *Conservation & Society*, 8(3), 171–181. <https://doi.org/10.4103/0972-4923.73806>
- Gabrys, J. (2014). Programming environments: Environmentalism and citizen sensing in the smart city. *Environment and Planning D: Society and Space*, 32(1), 30–48. <https://doi.org/10.1068/d16812>
- Hakkarainen, P., Frank, V. A., Barratt, M. J., Dahl, H. V., Decorte, T., Karjalainen, K., & Potter, G. R. (2015). Growing medicine: Small-scale cannabis cultivation for medical purposes in six different countries. *International Journal of Drug Policy*, 26(3), 250–256. <https://doi.org/10.1016/j.drugpo.2014.07.005>
- Heyman, J. M. (Ed.). (1999). *States and illegal practices*. Berg.
- Heynen, N., Kaika, M., & Swyngedouw, E. (Eds.). (2006). *In the nature of cities: Urban political ecology and the politics of urban metabolism*. Routledge.
- Hudson, R. (2014). Thinking through the relationships between legal and illegal activities and economies: Spaces, flows and pathways. *Journal of Economic Geography*, 14(4), 775–795. <https://doi.org/10.1093/jeg/lbt017>
- Hudson, R. (2020). The illegal, the illicit and new geographies of uneven development. *Territory, Politics, Governance*, 8(2), 161–176. <https://doi.org/10.1080/21622671.2018.1535998>
- Kilmer, B., & Pacula, R. L. (2017). Understanding and learning from the diversification of cannabis supply laws. *Addiction*, 112(7), 1128–1135. <https://doi.org/10.1111/add.13623>
- Kirby, T., & Peal, K. (2015). The changing pattern of domestic cannabis cultivation in the United Kingdom and its impact on the cannabis market. *Journal of Drug Issues*, 45(3), 279–292. <https://doi.org/10.1177/0022042615580990>
- Kitchin, R. (2014). *The data revolution: Big data, open data, data infrastructures and their consequences*. SAGE.
- Larkin, B. (2013). The politics and poetics of infrastructure. *Annual Review of Anthropology*, 42, 327–343. <https://doi.org/10.1146/annurev-anthro-092412-155522>
- Marvin, S., Rickards, L., & Rutherford, J. (2023). The urbanisation of controlled environment agriculture: Why does it matter for urban studies? *Urban Studies*, 61(8), 1430–1450. <https://doi.org/10.1177/00420980231200991>
- Marvin, S., & Rutherford, J. (2018). Controlled environments: An urban research agenda on microclimatic enclosure. *Urban Studies*, 55(6), 1143–1162. <https://doi.org/10.1177/0042098018758909>
- McFarlane, C. (2012). Rethinking informality: Politics, crisis, and the city. *Planning Theory and Practice*, 13(1), 89–108. <https://doi.org/10.1080/14649357.2012.649951>
- Mills, E. (2012). The carbon footprint of indoor cannabis production. *Energy Policy*, 46, 58–67. <https://doi.org/10.1016/j.enpol.2012.03.023>
- Polson, M. (2019). Making marijuana an environmental issue: Prohibition, pollution, and policy. *Environment and Planning E: Nature and Space*, 2(2), 229–251. <https://doi.org/10.1177/2514848619834847>
- Potter, G. R., Barratt, M. J., Malm, A., Bouchard, M., Blok, T., Christensen, A.-S., Decorte, T., Frank, V. A., Hakkarainen, P., Klein, A., Lenton, S., Perälä, J., Werse, B., & Wouters, M. (2015). Global patterns of domestic cannabis cultivation: Sample characteristics and patterns of growing across eleven countries. *International Journal of Drug Policy*, 26(3), 226–237. <https://doi.org/10.1016/j.drugpo.2014.12.007>
- Potter, G. R., & Klein, A. (2020). Coming out of the closet: Risk management strategies of illegal cannabis growers. In S. MacGregor & B. Thom (Eds.), *Risk and substance use: Framing dangerous people and dangerous places* (pp. 265–281). Routledge.
- Potter, G. R., & Wells, H. (2021). More harm than good? Cannabis, harm and the misuse of drugs act. *Drugs and Alcohol Today*, 21(4), 277–288. <https://doi.org/10.1108/DAT-09-2021-0047>
- Roy, A. (2005). Urban informality: Toward an epistemology of planning. *Journal of the American Planning Association*, 71(2), 147–158. <https://doi.org/10.1080/01944360508976689>
- Shim, M., Nguyen, H., & Grootendorst, P. (2023). Lessons from 20 years of medical cannabis use in Canada. *PLOS ONE*, 18(3), Article e0271079. <https://doi.org/10.1371/journal.pone.0271079>
- Shove, E. (2003). *Comfort, cleanliness and convenience: The social organization of normality*. Berg.
- Simone, A. (2004). People as infrastructure: Intersecting fragments in Johannesburg. *Public Culture*, 16(3), 407–429. <https://doi.org/10.1215/08992363-16-3-407>
- Swyngedouw, E. (2004). *Social power and the urbanization of water: Flows of power*. Oxford University Press.
- van Schendel, W., & Abraham, I. (Eds.). (2005). *Illicit flows and criminal things: States, borders, and the other side of globalization*. Indiana University Press.