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*The senses and circulation of beer in Amsterdam*

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# **Putting Taste To Work**

**The Senses and Circulation  
of Beer in Amsterdam**

**Tait Mandler**  
University of Amsterdam

Putting Taste to Work  
The Senses and Circulation of Beer in Amsterdam

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor  
aan de Universiteit van Amsterdam  
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Faculteit der Maatschappij- en Gedragwetenschappen

# **Putting Taste to Work**

## **The Senses and Circulation of Beer in Amsterdam**

**Tait Pugliese Mandler**

Dedicated to the yeast  
that have long metabolized urban worlds

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## Preface

*In 2017, the year I moved to Amsterdam, beer was at the center of public debate about the production and consumption of urban environments. Who is the city center for? How should it feel to be there? These questions were being raised around a particular technology of beer circulation: bierfietsen, or beer bikes, which take groups of people on beer drinking tours around the city. On any given day during the summer of 2016, fifty or so beer bike tours would make their way through Amsterdam's city center (Kruyswijk 2016). Also known as "bars on wheels", each tour would involve various degrees of pedaling, plenty of drinking, "buzzed" conversations between friends and strangers, probably some excited and revelatory shouting, and a bit of sight-seeing. Amsterdam's beer bikes may have been "beloved by tourists on stag weekends," but as their popularity grew, so did a movement of opposition (Dutchnews.nl 2017). City residents complained about the beer bikes' contribution to noise, traffic congestion, and general nuisance. In 2015, a petition against the bikes was submitted to the municipality (Pieters 2015). The petition and associated news coverage reported residents' stories of "having beer thrown on them, being spat on and people urinating in the street." Beer bike operators argued back that the kinds of rowdy and drunken behavior complained about are already prohibited by the city and a ban on the bikes won't make much difference. The contentious beer bikes reveal some of the ways the circulation of beer relates to the production of space. Their particular flamboyance draws attention to the technologies and infrastructures that make possible and are made possible by the circulation of beer. The shifting spatialities of beer bike garages and routes are one example of how beer becomes embedded in the morphology of the city beyond the obvious example of places for beer consumption. The rowdy spectacle of beer bike tours shows how the circulation of beer is contentiously engaged in the production of social space and sensuous atmospheres.*

# Introduction

This dissertation examines the metabolic circulation of beer in Amsterdam by tracing it through histories, geographies, and practices of production and consumption. By following the flow of beer through time and space, I explore how bodies, commodities, and cities are made and remade sensuously, unevenly, together. The key objective is to reveal the active role that the senses and sensory activity, in particular the understudied sense of taste, play in the socioecological metabolic process called urbanization. To do so, this research was guided by three questions, corresponding to three aspects of urbanization and the three empirical chapters of this thesis:

- (1) What role does sensory activity play in the production and circulation of commodities?
- (2) How is the activity of sensing engaged in the production and contestation of urban spaces?
- (3) How are the senses and sensuous desire enrolled in the embedding of new socio-environmental imaginaries into everyday urban life?

Through this investigation into the activity of the senses, and taste more specifically, in the production of commodities, urban spaces, and imaginaries, this dissertation offers a significant contribution to the field of urban political ecology.

First, a novel empirical contribution through the study of beer. Urban political ecologists have examined a plethora of socioecological flows and configurations, including water (Swyngedouw 2004; Gandy 2004; Kaika 2005; Loftus 2012), food (Heynen 2006), waste (Amuzu 2018), energy (Bruggeman and Dehaene 2017; Harrison and Popke 2017), animals (Barua 2016; 2017; 2019), and housing (Edwards and Bulkeley 2017; 2018), to name but a few (see also Chapter 1). While the metabolic circulation of beer may not be associated with life and death in the way that access to water (see Swyngedouw 2004) and urban hunger (see Heynen 2006) are, its profound historical association with everyday urban life and the development of cities can hardly be understated. With the exception of Lawhon's (2013) work in Cape Town, there has been little attention to the flow of alcohol, and beer specifically, in the urban political ecology literature.

Second, a theoretical contribution conceptualizing the senses as fundamental to the production of commodities and cities. While the sensuousness of urban

environments has been an impetus for much urban political ecology research and theorizing,<sup>1</sup> the active role of the senses in producing (and not only experiencing) these environments has received less consideration (although see Loftus 2012). By centering the sensorium, I open up a more embodied urban political ecology, as called for by Doshi (2017) in her generative intervention into the field. In particular, studying food and drink helps bring bodily metabolisms and their articulation with wider socioecological metabolisms into greater focus (Heynen 2006; Lawhon 2013).

Third, I seek to further enrich the already heterodox field (see Gandy 2021; and Chapter 1) through cross-pollination with research, theory, and methods from agri-food studies, science and technology studies, anthropology of the senses, and digital geographies. If, as Gandy (2021) argues, urban political ecology is at a crossroad and in danger of gradual marginalization, then a reaffirmed and deepened commitment to interdisciplinary research and conversation is especially vital. Accordingly, this dissertation also offers a contribution to these fields, perhaps especially the anthropology of the senses, in unraveling how the senses are engaged in the production and circulation of economic value in a western European city. The anthropology of the senses literature, on the other hand, has largely focused on the cultural meanings and values attached to the senses and historically emphasized cross-cultural comparisons (Classen 1997). The field, however, has more recently undergone much critical reflection and expansion (see Pink 2009; 2010; Ingold 2011). Ingold (2011), in his critique and contribution, suggests a re-grounding in ‘the practicalities of our sensing of the world’, which I take up in focusing on sensory practices over meanings.

To better understand how I position sensory activity within the process of urbanization, I first describe the way urban political ecologists attend to rural-urban metabolisms and circulations, and then consider how the senses are put to work in agri-food systems like the beer economy. This introduction then proceeds through a description of my research methods and a summary of the dissertation chapters.

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1 For instance, in her chapter about ‘the urbanization of nature’, Maria Kaika (2005, 22) writes: “Imagine, for example, standing at the corner of Piccadilly Circus and consider the socio-environmental metabolic relations that come together and emanate from this global-local place: smells, tastes, and bodies from all nooks and crannies of the world are floating by, consumed, displayed, narrated, visualized, and transformed.” See also Oosterlynk and Swyngedouw’s (2010) study of noise at Brussels airport.

# Metabolism and Circulation

Urbanization is commonly defined as a matter of demographic change, as the increasing concentration of human populations in cities, especially due to migration from rural areas. In the field of urban political ecology, however, urbanization is understood as a continuous but contested process of environmental transformation that interconnects cities and countryside (Heynen, *et al.* 2006). Cities, in other words, are not self-contained units that exist separate from, or in opposition to, countryside or nature; they are dynamic spaces of flows that extend well beyond their apparent limits. The movements of goods, bodies, and wastes into, around, and out of cities – enabled by a diversity of conduits, infrastructures, and technological networks – transform and produce urban landscapes as complex socioecological assemblages.

Metabolism and circulation are two concepts through which urban political ecology research has examined urbanization as a process composed of flows and relations that are simultaneously social, ecological, economic, geophysical, cultural, biochemical, and technological (see Swyngedouw 2006). Most simply, metabolism refers to the interactive transformation of matter (such as bodies turning food into energy and excretions) and circulation refers to its patterned movement (such as blood moving through the veins). Metabolism and circulation emphasize process, change, dynamism, and interconnection. These concepts have multiple genealogies branching through the natural and social sciences, including urban studies and planning practice, and have been used to describe, examine, and explain various entities and systems, such as bodies, cities, and ecologies. Urban political ecology adopts them from the historical materialist approach developed by Marx and Engels, who cast the production and circulation of goods as a process of human-nonhuman interaction – a socioecological metabolism – through which ‘internal’ (human) and ‘external’ (nonhuman, environments) natures are inseparably interrelated and co-transformed. In this way, the commonplace distinction between society and nature dissolves as the profound entanglements of bodily, urban, and ecological metabolisms and circulations come into view. Whether we consider food, water, energy, or shelter, the necessities of life are delivered – or not – through historically and geographically particular relations and practices of production, distribution, and consumption which metabolically interweave humans and nonhumans into the variegated ecologies that unevenly sustain us.

## Sensory Labor: Putting Taste to Work

Following Marx and Engels, labor is at the heart of the production and circulation of goods and thus mediates socioecological metabolisms. A recent special issue of *Food, Culture & Society* has called for research into the sensory labor of food systems, arguing that “if perceiving the tastes of foodstuffs both requires work and produces value, then – it seems to us – we can and should be talking about the nature of this work, what we think of as *sensory labor*, its place in the food system, and the effects of explicitly and implicitly enrolling eating bodies in the co-creation of a food system that may ultimately affect their bodily health” (Spackman and Lahne 2019, 143). Whereas Pierre Bourdieu famously considered taste to function as marker of class, an acquired habitus (a class culture turned into nature) that expresses a consumer’s social status, these scholars show that tasting is not confined to the sphere of consumption, both gustatory and aesthetic tastes are put to work in food systems as a form of paid labor. Taste and tasting practices, they argue produce and reproduce not only cultural but economic and ecological relations and values. The sensory labor of food scientists, quality control experts, sensory evaluation panels, chefs and sommeliers, farmers, and others (not to mention all manner of sensing technologies) mediate metabolic circulations of comestible commodities and thus the uneven co-production of environments and bodies. Sensory evaluation, although largely unappreciated in the everyday purchase and use of commodities, “plays a key role in shaping the actual lived-in (alimentary) environment we inhabit in the late-industrial world” (Lahne 2018, 7).

Following a dialectical understanding of labor as co-transforming both ‘external’ and ‘internal’ natures, producing them in historically particular ways, the way that bodies are put to work shapes their very form. Donna Haraway (1978, 38) has described how “our bodies are the product of the tool-using adaptation which pre-dates the genus *Homo*. We actively determined our design through tools that mediate the human exchange with nature.” Like our hands, our senses too have been shaped by practical activities and metabolic interrelations with nonhumans. “The forming of the five senses is a labor of the entire history of the world down to the present,” as Marx’s (1959, 46) well-known line goes. In this way, the sensorium is unnaturalized, historicized, and freed from the boundaries of an individual body’s skin. Accordingly, Haraway (1991) and other scholars engaged in material semiotics have stridently argued for situated, cyborg, and active understandings of sensory activity and sensorial knowledge as distributed across more-than-human networks.

Examining the practices, tools, and relations through which the senses are put



to work “demonstrates that the types and modes of sensory labor mobilized in the provisioning, making, and eating of food are not neutral – rather they coproduce modes of food production” (Spackman and Lahne 2019, 144). Through my study of the practical activity of sensing I explore the role of the senses in production and circulation of commodities, the making of urbanscapes, and the embedding of socio-environmental imaginaries into everyday urban life.

## Methodology

The research that underpins this dissertation was conducted in Amsterdam and the Netherlands between January 2017 and December 2019. My methods were qualitative, including participant-observation, autoethnographic research, semi-structured interviews, and the review of historical and primary documents. To follow the flow of beer through a section of the supply chain, my fieldwork sites included four craft breweries (three with attached pubs) in Amsterdam, two Amsterdam-based international wholesale craft beer distributors, one Dutch raw material distributor that serves Amsterdam’s craft breweries, and one specialty malthouse in the southern Netherlands. This research involved semi-structured interviews with four brewmasters, the owner of one beer wholesaler, the director of purchasing and sales of the other wholesaler, the owner of the raw material distributor, the maltmaster and director of sales at the malthouse. At the breweries and malthouse I observed the production process through detailed walk-throughs with the brewers and maltsters and at two breweries I sat in on their sensory evaluation panel. I also participated in a three-part sensory evaluation course and conducted two interviews with the expert who ran it. Additionally, I interviewed long-time participants in Amsterdam’s craft beer scene who provided oral histories going back to the 1980s, two municipal policy makers in the department of spatial and economic planning, and fifteen users of the beer rating and social networking app UnTappd, as well as using the app myself for over a year. While all of my interlocutors, with the exception of the sensory evaluation specialist, were Dutch, the interviews were all conducted in English and at no point did any interviewee express this being an issue. Finally, I collected, reviewed, and analyzed internal brewery and malthouse documents (mostly product analyses), industry magazines, brewer organization publications, technical handbooks and manuals, historical documents and archives, government publications, thinktank and business publications, newspaper articles, websites, advertising campaigns, and recorded conference presentations. Fieldnotes, transcribed interviews, and documents were iteratively coded (using NVIVO software) throughout the research period.

# Outline of the Thesis

This dissertation is divided into two parts. *Part I: Orientations* includes a published peer-reviewed journal article reviewing the field of urban political ecology and a historical chapter not intended for journal publication. *Part II: The Senses and Circulation of Beer in Amsterdam* includes three articles submitted to peer-reviewed journals.

## *PART I: Orientations*

**Chapter 1** provides an elaborate review of the urban political ecology literature, discussing some of the main contemporary debates in the field: the thesis of planetary urbanization, calls for a situated urban political ecology, the rift between politics and policy in urban studies, and considerations of the more-than-human. This co-written chapter, which emerged from a workshop held at the University of Amsterdam, speaks specifically to scholars working in and around urban political ecology and explores these theoretical debates without reference to beer or Amsterdam. Our purpose was twofold: (1) to emphasize and encourage the rich theoretical and methodological heterodoxy of urban political ecology and (2) to propose one possibility for an integrated, but not theoretically or methodologically homogenized, research agenda around peripheral, extended, and sub-urbanization.

**Chapter 2** lays out a history of the shifting political ecologies of beer circulation and their connection with the urbanization of Amsterdam and the Netherlands. I trace the history of Dutch brewing from monasteries in the Middle Ages, through its commercialization in the early modern period, industrialization in the 19<sup>th</sup> and 20<sup>th</sup> centuries, and into the emergence and proliferation of micro and craft brewing in the late 20<sup>th</sup> and early 21<sup>st</sup> centuries. My historical narrative is drawn largely from historian Richard Unger's (2001) studies of Dutch beer, the wider literature on beer's economic histories, de Vries and van der Woude's (2009) canonical political economic history of the Netherlands, and Marxist scholarship on the (Dutch) transition to capitalism. The intention of this chapter is to provide historical context and demonstrate the profound entanglements between shifting modes and techniques of beer production, political systems and regimes of taxation, unfolding rural-urban and inter-urban relations, class and colonial dynamics, changing consumer tastes and moral values, and ecological transformations. Additionally, I hope the reader comes away with a curiosity and appreciation for

the significant but often unrecognized role that beer brewing, trade, and drinking has played in the formation of the Dutch state, Amsterdam's rise as an urban metropole and colonial power, and everyday life in the Netherlands.

## *PART II: The Senses and Circulation of Beer in Amsterdam*

**Chapter 3** examines the art and science – or craft – of producing *quality* malts and beer. Discourses about quality have been central to the emergence of craft beer in terms of market segmentation, community formation, and brewer motivations and values. But what is quality and how is it achieved? More than simply a question of definitions, different ways of understanding, ensuring, and communicating quality shape production processes and articulate supply chains. This chapter addresses and questions three commonplace dichotomies: the opposition between craft and industrial production, the distinction between the objectivity of technoscience and the subjectivity of the bodily senses, and the division between rural and urban space. Drawing on science and technology studies, particularly Bruno Latour's (1993) discussion of modernity and Annemarie Mol's (2002) praxiography, I examine how multiple versions of good quality are enacted in a craft malthouse (located in the rural southern Netherlands) and brewery (located in Amsterdam) through the interplay of both instrumental (quantitative) and sensory (qualitative) practices that materialize particular qualities, or properties, of materials. I locate these practices within the history of brewing science and technology, which has transformed how the quality of beer is understood and known. The promise of modern brewing, made possible by the creation of the scientific brewer and manifested in the industrial brewery, was to tame the uncertainty of nature and assure objectively good quality beer through calculations and measurement. I suggest, however, that neither instruments nor sensations offer more objective evaluations and that different enactments of quality are instead about navigating overlapping uncertainties. Crafting quality is an ongoing concern throughout the beer supply chain and the unpredictable webs of humans and nonhumans that compose it.

**Chapter 4** explores how taste has contributed to transforming Amsterdam's urbanscape, specifically what I describe as its beerscape. This chapter questions the notion of taste as passive perception relegated to the domain of consumption, such as in invitations to 'taste the city'. If one can indeed taste the city, how does the city come to taste the way it does? I present three cases in which taste is productive of, in turn, space, value, and data. First, the historical role of taste

in catalyzing Amsterdam's craft beer scene, especially through the co-production of new tastes and squatter spaces in the 1980s. Second, the (wage) labor of taste in breweries that produces value and mediates the metabolic circulation of beer. Third, the sharing of taste and production of data on a geosocial beer rating app, Untappd, that permeates the mediatized Amsterdam beerscape. The three empirical sections of this chapter bring together interviews with brewers, beer sommeliers, and sensory evaluation specialists, ethnographic research at breweries, and autoethnography of sensory evaluation training and using the Untappd app. In arguing that taste is productive, I raise the question of cultivating 'good taste' as a political-ecological project. In showing how taste actively takes part in the production of space, value, and data, an interconnecting but contradictory dynamic emerges: a dialectic of taste equalization and differentiation.

**Chapter 5** uses the production, circulation, consumption, recycling, and waste of beer as a vehicle to consider how commodities and infrastructures materialize imaginaries of sustainable, circular futures by casting them as sensuously inviting and creating pathways to socioecological change. In addition to being considered a world capital of beer and brewing, Amsterdam has ambitions to become a capital of sustainability by recreating itself as a circular city. Circularity is a rapidly proliferating set of discourses and practices that aim, or at least claim, to reorganize production-consumption and society-nature relations. There are striking parallels to how the promises of modernity at the turn of the 20<sup>th</sup> century were embedded into and expressed by the production and display of new commodities and infrastructures – including the exhibition of Heineken's industrialized beer at world's fairs and the construction of its monumental factory in Amsterdam – as Kaika (2005), the co-author of this chapter, has argued. Considering the failures of modernization to deliver the just societies and tamed ecologies imagined by planners, architects, and designers, amongst others, it seems prescient to critically examine the emerging imaginaries and urban planning paradigm of circularity. This chapter asks whether the vision for a circular society remains one of commodified basic needs, broadening global inequalities, and technocratic solutions to socio-environmental ills, or whether circular practices can prevail in a pathway towards a shared sustainable future with less resource extraction? Through an analysis of policy documents, civil society organization and business publications, newspaper and magazine articles, and urban architectures, infrastructures, and artefacts, we show that recent changes in the production and metabolic circulation of beer are important for imprinting into the general public the ideal of circularity and a new way of managing urban infrastructures. We argue that beer and the networked infrastructures and

architectures of its production, circulation, and consumption are called upon to make grand and abstract circular dreams relatable and achievable, not only thinkable but sensible, enticing, and intoxicating.

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# **Part I**

## *Orientations*

# 1

## Moving urban political ecology beyond the ‘urbanization of nature’ thesis: Four challenges

### Abstract

Urban political ecology (UPE) focuses on unsettling traditional understandings of ‘cities’ as ontological entities separate from ‘nature’ and on how the production of settlements is metabolically linked with flows of capital and more-than-human ecological processes. The contribution of this paper is to recalibrate UPE to new urban forms and processes of extended urbanization. This exploration goes against the reduction of what goes on outside of cities to processes that emanate unidirectionally from cities. Acknowledging UPE’s rich intellectual history and aiming to enrich rather than split the field, this paper identifies four emerging discourses that go beyond UPE’s original formulation.

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## No outside left to conquer

[T]here can be no homelessness without an economic, political, and social process that produces ‘the home’ as a commodity; no refugees without practices of exile from a ‘country of origin’; no margin without a centre; no periphery without a core. (Kaika, 2004: 273)

The emancipatory potential of the urban planet lies in fact in the periphery. (Keil, 2018: 6)

In the opening scene of *Blade Runner 2049* (directed by Denis Villeneuve in 2017) we witness a dystopian future depicted against a monotonous synthesizer tune: vast, homogenized agricultural landscapes, dominated by synthetic farms and solar panels constitute the future of Los Angeles’ extended periphery. The film depicts the ultimate state of capitalism’s environmental ills, ironically combining ecological collapse with renewable energy, free/slave labor and mass-produced synthetic food (Astley, 2018). In a fantastic extrapolation and inversion of the original, *Blade Runner 2049* moves our gaze away from the smoggy and rainy streets of a dystopian downtown LA to the horizontal planes of everywhere, a horror-scenario of a “continuous city” sprawling over an ever-warming planet (Berger and Kotkin, 2017; Hern and Johal, 2018; Lerup, 2017). The extended urbanization of the planet is rendered full and final, with no possibility of escape to an alternative ‘outside’. *Blade Runner 2049* pictures an urbanization completed not only across but also beyond planet earth, where the outside and inside are no longer matters of concern; the only outsides left are ex-planetary dystopian/uninhabitable landscapes of waste and labor, those elements that Marx once thought of as the indispensable conditions of capitalist accumulation.

We may not be quite there yet, but the fires that burned in Alberta’s tar sands in 2016, across California in 2018-2019 (Serna, 2019), and across Australia in 2019, bring into sharp relief the consequences of a violent ‘feral’ suburban development (Shields, 2012); development ‘where there shouldn’t be any’ (Arellano, 2018); development that has burned in the past only to be rebuilt with public blessings and even subsidies (Arellano, 2018); development that led to new waves of destruction. The juxtaposition of the original to the new cinematic *Blade Runner* landscapes acts as an analogy for the shifts in real landscapes of urbanization in less than one generation that generated the need for a recalibration of our analytical categories in urban geographies. While humans have become more urban in location and lifestyle, they have done so on exceedingly expansive

terrain. In other words, whereas we now tend to live in urban environments, those urban environments are less dense than in the past and the more urban we get, the more suburban our existence appears (Angel *et al.*, forthcoming). When Henri Lefebvre visited Southern California, around the time of the first *Blade Runner*'s release, he observed that Los Angeles presented 'something stupendous and fascinating. You are and you are not in the city. You cross a series of mountains and you are still in the city, but you don't know when you are entering it or leaving it. It stretches for 150 km, twelve million inhabitants. Such wealth! Such poverty!' (Lefebvre, 1996: 208). Later, it became common, partly as a consequence of the Los Angeles School foray into the horizontalized region, to speak about the "Sixty-Mile Circle" that circumscribes the urban (Soja, 1989: 224) in Southern California or perhaps any city eventually. But that view was still from the center outward. It took another thirty years to understand that, while not all future cities will look like Los Angeles, they will certainly not follow the centralized Euro-US trajectories that Lefebvre as much as urban sociology and geography in the 20<sup>th</sup> century took as the model of development from which Los Angeles (or Houston, Johannesburg, Shenzhen, Sao Paulo or Djakarta) was considered an aberration.

During that same period (1980s-90s) critical urban geographical research and progressive urbanistic practice remained stubbornly focused on the urban center, even though it was expected that in the 21st century most of the world's urban populations would live in the urban periphery. This focus was particularly pronounced in prescriptive and normative assumptions underlying policy and planning for urban sustainability (see for a critique Wachsmuth, Aldana Cohen and Angelo, 2016; Wachsmuth and Angelo, 2018).

The contribution of this chapter is to recalibrate the project of UPE to these new urban forms and processes of extended urbanization that we have witnessed since the last quarter of the 20th century. We focus this exploration around the process of suburbanization as a fruitful way forward. Calling for an integrated political ecology of *suburbanization*, we ask how and to what extent the peripheral drives urbanization? And whether there is still a point in holding on to conventional uses of the terms 'urban' and 'suburban' altogether when it comes to exploring the urbanization of nature. This exploration responds to the call for resisting the reduction of what goes on outside cities to the dynamics and processes that emanate uni-directionally from cities (Keil, 2018a). Suburbanization here is defined as a function of what Lefebvre called extended urbanization (for an elaboration see Monte-Mor 2014a; 2014b; see also Keil, 2018e; Simone, 2019), which includes all manner of processes of peripheral urbanization and has as a common denominator a combination of non-central population and economic

growth with urban spatial expansion (Ekers *et al.*, 2012: 407; Keil, 2018d: 11). Realizing the contentious debate around naming urban peripheries worldwide (Harris and Vorms, 2017), we choose suburbanization as the umbrella term used in a comprehensive fashion in critical studies in global suburbanisms for the last decade. Suburbanization in this sense includes a vast variety of expansions of form and process at the urban edge: informal settlements, gated communities, tower estates, kampungs, desakota, peri-urban villages and, yes, classical subdivisions of ground related housing. The concept also entails suburban employment zones, office cities, aerotropolises as well as recreational and infrastructural spaces.

More recently, the suburban lexicon has been moving to the acknowledgment of post-suburban forms which are characterized by densely layered dynamics of growth and decline, densification and de-densification, increasing demographic and economic diversity and contradictory socio-economic dynamics (Johnson, Baker and Collins, 2018; Lawton, 2019). Contributors to this critical suburban research program have gone beyond the common use of suburbanization and suburbanisms (as distinct suburban ways of life; see Moos and Walter-Joseph, 2017; Walks, 2013) in the US-centric tradition and have pushed towards critical scholarship on suburbanization that takes its origin in the periphery of cities outside the West (Keil 2018d; Güney, Keil and Üçoğlu, 2019). This emerging suburban scholarship builds on traditions of conventional suburban scholarship in Geography and other urban related disciplines, for instance in historical geography (Harris, 2010); urban planning (Forsyth, 2012), demographic studies (for example the work of Champion [2001] on urbanization, suburbanization, counterurbanization and reurbanization); and classical political economy (Walker, 1981). The current critical suburban scholarship has focused on governance (Hamel and Keil, 2015), land (Harris and Lehrer, 2018) and infrastructure (Filion and Pulver, 2019). Large compendia of critical work have recently demonstrated the methodological variety of, contentious debates in, and global reach of these projects (Berger, Kotkin and Guzman, 2017; Hanlon and Vicino, 2018).

The dynamics of uneven capitalist development at play in the forbidding worlds of both the fictional *Blade Runner 2049* and the present extended urban landscapes where the consequences of the climate crisis are being felt, blur the boundaries of inside and outside, a classical definitory boundary constitutive of urban studies: the city is where countryside is not. In this situation, the dystopian present and future we face emphasizes further that the matter of concern should not be environments, or cities per se, but rather: ‘the urbanization *OF* nature, i.e. the process through which all types of nature are socially mobilized, economically incorporated (commodified), and physically metabolized/transformed in order to support the urbanization process’ (Swyngedouw and Kaika, 2014: 462; original

emphasis). This interdependence between the ‘ecological’ and the ‘urban’ and its constitutive processes, along with the production of uneven geographies (Heynen, 2017b), has been the key focus of UPE for almost two decades (Connolly, 2018). As noted by Swyngedouw and Kaika above, a key characteristic of UPE scholarship is the development of an understanding of the ‘urban’ not as a bounded city within which political-ecological contestations are played out, but as a process of continuous socio-ecological transformation, a critical response to readings of urban and environmental issues that view ‘cities as purely social spaces... entirely separate from the countless non-human entities and organisms that are enrolled in, and help shape, urban life’ (Braun, 2005: 635).

Since its inception in the 1990s, UPE scholarship has been concerned with the examination of continuous socio-ecological transformations as a dialectic between inside and outside, urban core and periphery, local and global (Swyngedouw, 1995; Keil, 1998; 2003; Swyngedouw and Kaika, 2014; Keil and Macdonald, 2016). Examining the local in relation to the global, the margin in relation to the center, the unfamiliar as part of the familiar, the outside and the inside as one continuous process have been constitutive of the critical examination of the ‘urbanization of nature’ thesis (Kaika 2004; 2005; 2014). Focusing on the geographies of the home, Kaika (2004) argued that the construction of a familiar safe ‘inside’ is predicated upon the simultaneous existence *and* exclusion of an unfamiliar ‘outside’. Whether undesirable environmental elements (disease, bad weather, refuse or sewage) or undesirable social elements (homelessness or refugees), the exclusion of the outside guarantees the familiarity of the inside. Being familiar in one’s home is dependent on being alienated, disconnected from social and natural processes that are supposed to take place outside this privileged core (Kaika 2004; 2014). On a different scale but dealing with enclosure in the same logic, Marvin and Rutherford (2018) discuss ‘controlled environments’, namely urban spaces that are enclosed and engineered to create microclimates (1144); they argue for a similar dichotomy of outside and inside, the former allowing for the construction of the latter so that it can protect from ‘turbulence and hostility’ (1157).

As socio-environmental disasters like the wildfires of late demonstrate the relation between ecological problems and urbanization processes, and dominate political debates and agendas across scales, UPE’s call to overcome the distinction between inside and outside, to understand the dialectic between the local and the global that produces uneven development, to understand the core and the periphery as part of the same socio-environmental continuum is today more relevant than ever. A focus on the socio-environmental consequences of extensive urbanization is equally important politically. However, despite

advanced theoretical debate within UPE and an increasing empirical focus on extended urbanization, an integrated research agenda for an UPE beyond the city has yet to be concretely developed. Indeed, it could be argued that UPE's call to overcome the distinction between core and periphery, inside and outside, still privileges (at least discursively) the inside, the core, and the center as the spaces that dictate the logic of the outside, the periphery, the margin.

In this article, we shift the vantage point away from this privileged urban 'core' or 'inside', in order to sketch an integrated research agenda for an UPE beyond the city, by exploring if – and to what extent – it is also (or even mainly) the 'margin', the 'outside' and the 'periphery' that dictates the logic of the 'core', the 'inside'. We argue that moving UPE beyond the city means taking seriously the dynamics of sub-urban, ex-urban or peri-urban spaces as representing 'a meeting or overlapping of dynamics associated with the urban and the rural, a distinct and emergent landscape in-between' (McKinnon *et al.* 2017: 3). Our call for a more-than-urban political ecology also responds to recent calls to situate UPE (Lawhon, Ernstson and Silver, 2014; Truelove, 2011; Loftus, 2012) and for increased attention on southern and subaltern urbanisms (Lawhon *et al.*, 2014; Ranganathan, 2014; Roy, 2009; Silver, 2017; Truelove, 2016; Zimmer, 2010).

Following McKinnon *et al.* (2017), who note that the spaces and lives of those outside urban centers have been largely overlooked by urban geography, despite being part of the 'urban' population, we call for an integrated political ecology that examines processes and management practices beyond the privileged scales and places that have been the focal point of earlier UPE analysis. We suggest that this perspective has much to contribute in exploring thus far neglected actors and relations between institutions and political and economic forces involved in the urbanization of nature.

## **Beyond the 'urbanization of nature' thesis: four challenges**

In her review of UPE literature, Zimmer (2010) claims, first, that the definition of the city remains unclear and wonders 'what characterizes the difference between city, peri-urban, and rural areas' (351). Regional dynamics after all have become especially crucial in understanding the patterns of urbanity (Neuman and Hull, 2009; Paasi, Harrison, Jones, 2018). Second, she notes an under-acknowledged (semantic) tension between language such as 'societal relationships with nature' and Latour's concept of hybridity, which rejects not only any distinction between 'society' and 'nature' but often discards both terms entirely. These challenges



have been addressed and continue to be debated by UPE scholars over the last decade.

A series of more recent reviews by Nik Heynen (2014; 2015; 2017) and Collard *et al.* (2018) also reflect on the multiple directions UPE scholarship is heading towards. Using a chronological stage model, Heynen categorizes UPE scholarship in two ‘waves’. The ‘first wave’ of UPE, according to Heynen, includes foundational texts *Concrete and Clay* (Gandy, 2002), *Social Power and the Urbanization of Water* (Swyngedouw, 2004), *Nature and the City* (Desfor and Keil, 2004), *City of Flows* (Kaika, 2005), *Lawn People* (Robbins, 2007), and culminates with the 2016 volume *In the Nature of Cities* edited by Heynen, Kaika and Swyngedouw. While a variety of approaches to, and applications of, UPE are present in this volume, most draw theoretical inspiration from Swyngedouw’s framing of metabolic circulation, reiterated in the second chapter. The ‘second wave’ of UPE, according to Heynen (2014; 2016; 2017a), comprises an emerging body of literature that is critical of UPE’s early framing. It includes research more attentive to race (Heynen, 2016), gender and sexuality (Heynen, 2017a), incorporating postcolonial, indigenous, feminist, and queer theory. While some authors maintain a commitment to a metabolic circulation framing, others move in new directions, often more concerned with the everyday and micro-politics.

Heynen’s chronological framing of UPE in two distinct waves may be useful for didactic purposes. However, his suggestion that UPE progresses in a somewhat linear manner with the latest scholarship being the ‘best’ and only ‘critical’ UPE scholarship is unhelpful. Suggesting that UPE scholarship is split into two camps (or waves) that somehow compete over which is the most ‘critical’ is an unfounded proposition, whose purpose in terms of enriching or moving the field forward is elusive. Therefore, in order to avoid inflicting unnecessary violence on sub-disciplinary histories, we propose instead to recognize the messiness of both earlier and recent UPE scholarship as a fruitful engagement amongst scholars, and to acknowledge the history of UPE as a heterodox field right from its inception. To suggest the contrary, would mean editing out the complexities and critical engagement inherent in the field’s early debates and intellectual history (see also Connolly, 2018).<sup>2</sup>

Aiming to enrich rather than split the field, this chapter identifies four emerging discourses in contemporary UPE, often in generative and productive dialogue with each other and with the diverse strands of recent and earlier scholarship. The first emerging discourse is a critique of UPE’s alleged methodological ‘city-ism’

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2 We are grateful to one of the reviewers who urged us to make this point part of our argument. Some of the ideas and even phrasing in this paragraph is attributed to them and is acknowledged here as such.

and a call for UPE to ‘fulfill its Lefebvrian promises and contribute to a planetary, ecological, political understanding of contemporary urbanization’ (Angelo and Wachsmuth, 2014: 24). The second emerging UPE discourse is the call for a ‘situated’ UPE coming from feminist UPE scholars and scholars working on and in the Global South who hope to create ‘the possibility for a broader range of urban experiences to inform theory on how urban environments are shaped, politicized and contested’ (Lawhon *et al.*, 2014: 498). This work overlaps with theoretical and practical interventions ascribed to Southern urbanism and urban theories based on life in cities in the southern hemisphere (Bhan, 2019; McFarlane and Silver, 2017; Silver, 2014; Simone, 2004). The third emerging discourse tries to narrow the almost ontological rift between academic debate and policy/politics. Whilst academic debate is questioning ‘the urban’ not only as valid conceptual framework but also as a distinct ontology, policy discourses put increasing emphasis on the urban and on cities as the object of inquiry, analysis, data collection and intervention. We argue that this rift between academic and policy debates has significant political as well as scholarly implications. The fourth emerging UPE discourse is a call to address the conceptual and methodological challenges around researching human and more-than-human actors by showing not only how ‘cities are produced through socio-natural metabolic flows originating “elsewhere”’; but also how cities and their specific sociopolitical contexts and spatial configurations have strong implications for how... non-human natures are urbanized’ (Connolly, 2018: 2). In the following sub-sections (II.a, II.b, II.c and II.d), we explore further each one of these contemporary challenges for UPE scholarship.

## **Challenge one: Lefebvre’s Planetary Urbanization thesis and UPE**

The planetary urbanization thesis (PU) has had a presence in theoretical and conceptual debates within UPE right from the beginning: ‘to speak now about UPE as central to urban studies in general may be interpreted as responding to Lefebvre’s challenge to create an urban science for an urban world’ (Keil, 2003: 728; see also Angelo and Wachsmuth, 2014; Soja and Kanai, 2007: 62). Perceptively, and compatibly with our argument, Castriota and Tonucci make the case that PU potentially produces a ‘new vocabulary of urbanization through the construction of an ex-centric perspective that dislocates the focus of analysis from its conventional center: the city’ (2018: 512).

Yet, ‘most research [in UPE] while recognizing the globalized societal relationships with nature that constitute urban life today, and the complex

governance processes that regulate them, has looked at individual or comparative case studies, not at the networked matrix itself on which urban-nature relations are made and unmade' (Keil, 2011a: 716). In a critical commentary on the UPE literature, Angelo and Wachsmuth (2014) warn against a 'methodological cityism,' which 'refer[s] to an analytical privileging, isolation and perhaps naturalization of the city in studies of urban processes where the non-city may also be significant' (20; see Connolly, 2018 for a response). While there is nothing inherently wrong *per se* with research carried out in cities, they suggest there is a danger to this being the overwhelming norm: 'An urban studies that is (city) site rather than (urban) process focused thus risks ignoring much of what is distinctive about the contemporary urban world' (2014: 23). Moreover, McKinnon *et al.* (2017: 8) write: 'In effect, the creation of UPE has, at least to some degree, reinforced the nature-society divide it was attempting to dissolve by reinforcing its analog, the urban-rural divide. Only a few studies in the UPE tradition have worked across this spatial divide - or as some social-ecological scientists might suggest, this gradient - by focusing outside the city proper.'

Angelo and Wachsmuth (2014) offer two possible directions for future, more Lefebvrian-focused research. The first: to 'investigate processes of socionatural transformation that systematically differentiate, within specific regions or at larger scales, city from non-city - in other words, to show how urbanization produces, materially or representationally, spaces understood as urban or rural, or materials understood as natural or social' (2014: 24). The second: 'to more rigorously interrogate [urbanization's] global uneven development, tracing features of the urban world across the planet and integrating those that rarely if ever appear in cities' (2014: 25). An example is Arboleda's (2016) work on spaces of extraction, showing how urbanization produces 'nature' and 'space' well beyond the city through a dialectic of homogenization and fragmentation. Or as Wilson and Jonas (2018: 2) argue, 'planetary urbanization posits a simultaneity of process, with urbanization best understood by recognizing "temporal flows" of relentless, multi-directional spillages, leakages, causal criss-crosses, and trans-boundary processural connections'. Keil (2018a) likewise encourages a Lefebvrian reaffirmation, identifying neoliberalization and climate change as the forces currently providing the conditions for planetary urbanization (7). He adds however that to avoid the very present 'danger of becoming a vacuous shell for academic debate', the PU thesis 'must be politicized again and linked to its revolutionary origins' (Keil, 2018a: 3). Viewing the PU thesis as the 'outcome of half a century of urban struggles,' Keil points to feminist and postcolonial concerns about totalization and universality, but in particular to activist and liberationist concerns from which he expects generative impacts on theorizing

(Keil, 2018a: 5).

Indeed, feminist geographers have offered strident critiques of the planetary urbanization thesis (Buckley and Strauss, 2016; Oswin, 2016; Derickson, 2017; Butcher and Mclean, 2018; McLean, 2018; Peake *et al.*, 2018). For Derickson (2017) planetary urbanization does not appear to be interested in becoming a situated theory; instead it relies on what Donna Haraway (1988) describes as a ‘god trick’ that reproduces a ‘conquering gaze from nowhere.’ In other words, while Derickson (2017: 558) shares planetary urbanization’s ‘interest in and concern with the relational and hybrid nature of social relations and their interconnectedness, and a concomitant rejection of the kind of dualisms like urban/non-urban... if these findings are to be effectively political, there are important implications for the production of knowledge’. Oswin (2016) adds the call to ‘queer’ our thinking of the planetary urbanization lens, arguing that the concept can be too comprehensive and violent to other critical urban approaches. In their critical engagements, and with reminders of Lefebvre’s own interest in differences and the everyday, these scholars have affirmed ‘epistemic plurality’ (Buckley and Strauss, 2016), ‘chaotic research pathways’ (McLean, 2018) and ‘other fields of vision’ (Peake *et al.*, 2018). A number of researchers have shown the value of considering the everyday lives of a variety of subjects (Loftus, 2012; Ruddick *et al.*, 2018). As one way forward, Loftus (2018a) renegotiates and transcends the ‘grounded-planetary’ dichotomy, suggesting the two as mutually constitutive and promotes ‘a philosophy of praxis that begins from lived practices’ (94). Thus, not only is there a need for a Lefebvrian redirection, but a *situated* UPE at that, taking to heart the empirical, theoretical, and methodological insights of feminist and Global South scholarship (we take this up in section II.c).

## Challenge two: the call for a Situated UPE

The call for situated UPE scholarship mobilizes a Global South perspective as a tool for conceptual and empirical reorientation, rather than simply as an afterthought. This direction enriches the field with new research methods, theoretical framings and practices from the Global South, thus provincializing north-centered UPE debates (Lawhon *et al.*, 2014; 2016; Loftus 2019a). Such scholarship has suggested giving more attention to everyday practices (Loftus, 2012), a more nuanced examination of power as diffused and relational (Lawhon, 2012; Lawhon *et al.*, 2014), and an emphasis on race, gender and location (Njeru, 2006; Truelove, 2011, Loftus, 2019b). Furthermore, the importance of conceptualizing environmental justice issues beyond the usual North-South divide (Ranganathan and Balazs, 2015; see Keil, 2020, for an extension of this

argument) is only growing as extended urban systems are now being prepared for the climate emergency through global systems of financing, knowledge and engineering (Goh, 2019).

One particularly fruitful focus has been infrastructure, including the production of networked infrastructures beyond the city (Cowen, 2019; Filion and Pulver, 2019; Van Neste, 2019) and the everyday practices related to infrastructure use and delivery (Bhan, 2019; McFarlane and Silver, 2017; Silver, 2014; Simone, 2004). The engagement with infrastructures has always been a critical component of UPE (Kaika and Swyngedouw, 2000; Graham and Marvin, 2001; Young and Keil, 2005), but the call for a situated UPE is in dialogue with the recent ‘infrastructural turn’ in urban studies (Graham, 2009). Lawhon *et al.* (2018), in a critical response to the idealization of universal, uniform infrastructure by urban theory of the Global North, propose ‘heterogenous infrastructure configurations’ as an analytical lens that, amongst other things, troubles the formal/informal binary by directing research towards ‘the conditions under which particular socio-technical artefacts work, for whom they work, and what it means for infrastructure to work’ (730). Doshi (2017: 125) reminds that ‘the body is [often] mobilized in conceptualisations of cities and infrastructure while material embodiment remains under-studied and disparately theorized.’ Drawing on research in the Global South, she offers five propositions: ‘attention to [embodied] metabolism, social reproduction, intersectionality and articulation, emotion and affect, and political subjectivity.’ Similarly, Holifield and Schuelke (2015) call for incorporating the aesthetic mobilization of desires into UPE analyses of process and disruption.

Along with perspectives from the Global South, the call for a situated UPE, in our view, should also include indigenous political ecologies, theories and practices of decolonization, as well as abolitionist political ecologies (Heynen, 2016; 2018). Indigenous political ecologies are especially relevant in settler colonial societies – such as Australia, Canada and the United States, where suburbanization has been prominent, and where the clash between suburbanization as a way of life and traditional ways of living on the land has been most pronounced (Maginn and Keil, 2019; Middleton, 2015; Veracini, 2012). This extends not just to suburbs or peripheries as places but also as sites and products of relational connectivities. As Kipfer (2018: 474) has shown for the case of pipeline politics in Canada – so central to the continuation of the suburban project in the country and internationally – ecological thinking around extended urbanization cannot do ‘without resorting to... approaches that help us understand the settler-colonial aspects of Canadian urban history and grasp the inter-national dimensions of Indigenous politics.’ (see also Hern and Johal, 2018; Pickerell, 2018). Simpson and Bagelman (2018) argue that in occupied British Colombia while a ‘colonial socionatural order’ has

been imposed on millennia-old (indigenous) Lekwungen socioecologies these have never been completely erased such that the production of nature proceeds through the ongoing interplay of colonization and resistance. A similar call for more emphasis on de-centralizing, ‘counter-hegemonic’ processes comes from Gururani and Vandergeest (2014) who suggest a change in our focus towards ecological knowledge produced by local actors. As Schulz (2017) makes clear, decolonization is not only about recognizing material processes of appropriation and subjugation but also hierarchies of knowing and being that structure research practices: ‘The careful building of a pluriversal dialogue that is neither embedded in culturalism nor absolute particularism, but in the realization that multiple loci of enunciation coexist and are entangled through the coloniality of knowledge, being and power, will thus be the major task that lies ahead for a decolonial-ecological critique in and of the Anthropocene’ (139).

## **Challenge three: addressing the rift between urban policy/politics and academic debate**

Whilst academic debate moves beyond privileging cities as objects of inquiry, cities are increasingly becoming the preferred sites of policy and governance-experiments attempting to address climate change: from the UN’s Urban Agenda to circular economies and smart cities experiments, cities are now expected (in policy rhetoric) ‘to save the planet’ (Kaika, 2017; Angelo and Wachsmuth, forthcoming).<sup>3</sup> Increased attention to cities in policy making is also reflected in experiments with ‘translocal’ responses (Bulkeley *et al.*, 2014), ‘climate change experiments’ (Broto and Bulkeley, 2013), ‘municipal voluntarism’ (Bulkeley and Betsill, 2013), the changing role of the state (Loftus, 2018b), and a proliferating number of ‘urban laboratories’ across the world (Turner and Kaplan, 2018: 7). Theorizing such governance practices is central in contemporary UPE literature, particularly in the context of neoliberal reorganizations and shifting discourses and practices of urban sustainability, circularity, and resilience (Leitner *et al.*, 2018; Gabriel 2014; Lynn, 2017).

These debates strengthen the original UPE focus on governance issues. For instance, Cohen and Bakker (2014) investigate how environmental governance is being rescaled through ecological concepts, like bioregions, and suggest that this is a depoliticizing move. They theorize the eco-scalar fix: ‘a process of rescaling

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3 This paper by Angelo and Wachsmuth is the introduction to a special issue with a set of very topical empirical contributions for *Urban Studies*. Keil (forthcoming) is a commentary which also reflects on the papers in the special issue.



and reorganizing governance as a strategy of either internalizing or externalizing socio-environmental externalities, or both, and thereby displacing conflicts and crises, often through the construction of (purportedly ‘natural’) ecological scales, which simultaneously depoliticize and repoliticize governance’ (2014: 132). Similarly, the Ontario greenbelt has been interpreted as a scalar fix to unlock existing urban-suburban policy conundrums in the Toronto region - in this case to the benefit of the protected greenspace on the suburban and rural fringe and on behalf of growth control measures leading to intensification in related growth centers off the greenbelt (Macdonald and Keil, 2012). Amuzu (2018) articulates UPE with environmental justice in looking at the governance of e-waste. The financialization of risk and green infrastructures or “greeninfrastructures” (especially in the urban periphery) is the concern of a growing number of scholars (Christophers, 2018; see also Bryant, 2018; Macdonald and Lynch, 2018; Ouma *et al.*, 2018; see also Harker, 2017, on debt; Loftus *et al.*, 2019). Rice (2014) contributes an investigation of climate change through carbon governance that emphasizes individual behavior instead of attending to carbon intensive development. Mee *et al.* (2014) construct an UPE of housing through the lens of water while Edwards and Bulkeley (2017; 2018) research ‘climate changed housing as infrastructure’, arguing: ‘climate change reconfigures the circulations of the city in ways that allow both the state and capital to reach further into the home. It does so by transforming who is governing housing, how housing is being governed, and whose housing stands to benefit’ (2017: 1128). In other words, ‘there is no such thing as an unsustainable city in general, but rather there are a series of urban and environmental processes that negatively affect some social groups while benefiting others’ (Heynen *et al.*, 2006: 10). Speaking from an UPE standpoint, Kaika (2017: 91) demonstrates the problem of using resilience uncritically in current literature and policy by criticizing the idea that nature can be ‘injected’ into cities through parks or green roofs. Consequently, she proposes: ‘If we took this statement seriously, we would need to focus instead on identifying the actors and processes that produce the *need* to build resilience in the first place. And we would try to change these factors instead’ (95). Her approach can inform issues of urban design especially when analyzing the sustainability of ‘cities of the future’, since such analyses are often lacking a deeper probing of the politics and history of environmental challenges (Glazebrook and Newman, 2018). Similarly the non-human domain studies are dominated by positivist science that obscures its cartesian ideology (Cutts and Minn, 2018).

Nonetheless, the rift over prioritizing (or not) the urban between academic debate and policy/governance practice is also reflected in the UPE literature. UPE literature that is more concerned with questions of policy and governance is less



(or not) concerned with problematizing or further engaging with theorizations of urbanization in relation to UPE and questions of environmental governance; and vice versa. Accordingly, in this chapter we stress the importance for UPE to anchor itself both on problematizing (sub)urbanization processes and governance questions.

## **Challenge four: rethinking ‘invading’ species: from soil, water and air, to concrete and bacteria**

A discussion about inside and outside, core and periphery, the urban and the ex-urban cannot ignore the more-than-human elements involved in the production of space. Expanding common UPE concerns of commodification, circulation, and metabolism to encompass animals, Barua (2016; 2017; 2019) has shown how lively commodities and nonhuman work are part of urbanization processes. Barua and Sinha (2019) have done interesting work on ‘animating the urban,’ asking ‘how commodification or metabolism affects and alters the sentient experience of animals’ (1164; see also Barua, 2014). Gandy has likewise recently considered the intersections of urbanization and nonhuman species (2019), as well as biodiversity more broadly (2016). The more-than-human also seems to be of particular relevance as geographical concepts of ecologies are taking on board explicitly ‘volumetric’ perspectives (Graham, 2016). Still, an interest in more-than-human UPE is yet to benefit from in-depth cross-fertilization and engagement with STS, landscape ecology, or the work of Tsing (1993), de la Bellacasa (2017) and the latest work of Haraway (2016) that cross disciplinary and sub-disciplinary boundaries and disrupt the categories of center/periphery but also of human/more-than-human.

Related to extended urbanization is work on ‘the spread of “invading species”’, which Wu and Hobbs (2002: 358) refer to as an ‘increasingly important ecological and economic problem’— a statement that could just as easily refer our own species and invasions of various kinds. After all, the authors call for ‘incorporating humans’ and their ‘perceptions, value systems, cultural traditions, and socioeconomic activities’ into landscape ecology (Wu and Hobbs, 2002: 364). There have been several attempts since to integrate the analysis of the physical landscape with human activity (Cumming, 2011) but, by mainly focusing on issues of sustainability and especially ‘resilience’, the analysis often misses the mark by taking a de-politicized perspective (Ahern, 2013; Lovell and Taylor, 2013). Landscape ecology literature largely reproduces the dichotomy of ‘urban’ and ‘nature’ (Jennings *et al.*, 2017; Wu, 2013) and such studies even go as far

as suggesting that ‘a small set of landscape metrics is able to capture the main spatiotemporal signatures of urbanization’ (Wu *et al.*, 2011: 7).

Non-human life isn’t the only more-than-human consideration in need of attention. Marull *et al.* (2010: 498) argue that ‘the process of urban sprawl provides the extreme opposite example [of stability brought through a heterogeneous space-time model], since it always seeks to increase its economic competitiveness by increasing the entropy spread to periphery environments’, with the increased production of CO<sub>2</sub> emissions, waste, concrete, electronics, etc. For example, ‘second only to water, concrete is the most consumed material’ in the world (Gagg, 2014; see also Harvey 2018: 177), and capitalism’s addiction to concrete goes hand in hand with suburbanization, with China, India, the US and Turkey leading the way (Keil 2018d). In the same way as water provision in cities, or the disruption thereof, illustrates the messy continuity of ‘city’ and ‘nature’ (Kaika, 2005), suburbanization through concretization is a violent, fetishized process of unabated, seemingly immortal expansion (on water’s political ecology see also Swyngedouw, Kaika and Castro, 2002). Contemporary construction with concrete however has serious environmental issues due to the CO<sub>2</sub> emissions from concrete’s production (Naik, 2008, DeJong *et al.*, 2010), since producing one ton of cement releases almost as much CO<sub>2</sub> while the growth rate of cement-related CO<sub>2</sub> emissions is constantly rising (Chang, Im and Cho, 2016). There are several serious (environmental) effects that the widespread use of cement causes: soil contamination, water runoff, lung disease from dust. Even papers seemingly exclusive to analyzing soil improvement begin with an immediate emphasis on concretized (sub)urbanization (DeJong *et al.*, 2010: 197). Chang, Im and Cho (2016) propose to look for solutions in biopolymers when addressing the issues of carbon emissions due to the extended use of cement, while bacteria are seen as the new method for concrete to ‘self-heal’ in a process called bacteria-based calcium carbonate precipitation (Wang *et al.*, 2014) and bacteria-induced enzymes are regarded as saviors even against plastic pollution. Instead of asking what underlies such planetary threats, many insist that ‘the scientific community who ultimately created these ‘wonder-materials’, must now use all the technology at their disposal to develop real solutions’ (Gabbatiss, 2018).

The politics of ecology become especially discerning when related to something as fundamental as air and oxygen (reminiscent of the genocidal weaponization of air in WWI and WWII). Nowadays the politics of air are becoming increasingly instrumental in oppressive policing of the body and making air an ‘integral part of sovereign power’, as Nieuwenhuis (2018: 90) argues through the case of gassing events during protests globally (2016). Gandy (2017) situates urban air through an ontological discussion on ‘urban atmospheres’ and ‘affect’: the (uneven and

unequal) geography of air reminds us how ‘air spaces have been constituted in part by the racialized and classed bodies that live, work, and play in them’ (Choy, 2011, cited in Gandy, 2017: 364). While urban areas are generally positioned as sources of heat and pollution that harmfully diffuses to less urbanized areas (Graham, 2015: 196), the movement of air has little concern for such categories as it crosses bodily and territorial boundaries with troubling nonchalance. Nieuwenhuis (2018: 91) proposes an alternative decolonial reconnection of nature and society by ‘seeing the ‘right to life’ not as a hierarchical relationship that originates from a metaphysical authority of human law over ‘nature’ but as recognition for our always already atmospheric being-together-with humans and more-than humans.’

## Moving UPE beyond the city

In the previous sections we discussed UPE in relation to changing/invading material flows across landscapes of extended urbanization. However, the conceptual/theoretical challenges identified above go hand in glove with the need to expand UPE’s methodological and empirical scope. In this section, we address briefly these challenges and suggest a shift of empirical focus on the changing relationships of suburban natures as a possible fruitful expansion and opening of the field.

A key common characteristic of scholarship that moves UPE beyond the city in recent years is a commitment not only to engaging with research beyond urban geography and urban studies, but also a commitment to empirical work that cuts across traditional understandings of the ‘urban’ and goes beyond a focus on the ‘core’. In a series of articles Ekers and Prudham (2015; 2017; 2018) theorize the ‘socio-ecological fix,’ which may help understand landscape transformations without relying on bounded notions of ‘urban’ and ‘rural’ (see also Andreucci *et al.*, 2017). Coplen’s (2018) work on food systems illustrates how following complex supply chains can be a method for research across urban-rural divides (see also Agyeman and McEntee, 2014; Alkon, 2012; Hovorka, 2006). Saguin (2017) explores the production of non-urban ‘hazardscapes’ through urban-rural metabolisms, while Rice and Tyner (2017) offer a compelling UPE of rural mass violence in Cambodia. Gururani (2002) demonstrates how rural women in the Indian Himalayas constitute their identities through everyday practices and calls for a culturally embedded analysis of nature-society relations. Focusing on the Caribbean, Harrison and Popke (2017) begin to theorize ‘island energy metabolism’ and conceptualize the relations between particular materialities of energy sources and islands, and particular territorial, infrastructural, and

geopolitical characteristics. A cross-fertilization between UPE and agrarian political economy, has also produced significant methodological insight for moving UPE beyond the city. As Karpouzoglou *et al.* (2018: 491) note: ‘social inequalities arising from land-use change, inequalities in terms of access to safe and clean water, and the management of industrial waste are only some of the pressing issues that will continue to rise in importance and will require a joint endeavor of thinking across UPE and peri-urban scholarship.’

Scholars have also turned the analytical lens of UPE onto suburbanization processes themselves (Keil and Macdonald, 2016; Angelo, 2017; Taylor, 2011). The suburban has traditionally been depicted as the dumping ground of functions or people undesirable to a perceived lively, healthy, desirable core: from factories, nuclear plants, and garbage dumps to retirement homes and revalidation centers. But this perceived relationship between the peripherality of space and the marginality of people has led to a certain blindness in urban literature itself: ‘Few urban political ecologists have paid detailed attention to the views and perspectives of those marginalized in everyday ecologies, and the differences within and among these groups... A new focus on the micro-metabolisms of everyday life beyond the non-human would help urban political ecologists to open up what the urban means to a richness of life that exists within the human species.’ (Shillington and Murnaghan, 2016: 1022).

This has changed in recent years, as political ecology research on the spatial periphery often intersects or overlaps with inquiries on social marginalization. Gustafson’s (2015) work in southern Appalachia, and Schmidt’s (2017) work on the re-production of wilderness in Houston’s suburbs are cases in point; they both explore how the exurban is produced through local contestations over knowledge and power. Also focusing on practices of marginalization Batubara *et al.* (2018) recently explored the politics of flood infrastructure in Jakarta to demonstrate how inequality is reproduced through urbanization processes such as the extraction of cement from the periphery that is utilized to transform the city. Parés *et al.* (2013: 342) show how the suburbs of Barcelona emerge through a dialectic of capital flows and the materialization of desires for consumption (homes in this case), a kind of intertwined process of morphological suburbanization and new suburban ways of life. Finally, Bruggeman and Dehaene (2017) propose a distributed model of urbanization through a study on the expansion of electricity infrastructures in Belgium across urban and rural spaces.

The very concept of suburbanization is inevitably expanded in these studies. It is understood as a ‘global process’ that exceeds conventional conceptualizations in urban studies but needs to be studied as distinct from (though not unrelated to) planetary urbanization. Tzaninis and Boterman (2018: 58) argue that the

transformation of cities and suburbs are not even ‘two sides of the same coin’ but rather resemble a ‘cyclical, non-dichotomous spatio-temporal process’. Keil notes:

As suburbanization becomes the process and suburbanism becomes the way of life of much of the urban revolution, criteria like density, morphology, social composition, etc. must be reevaluated. The notion of suburbanization as dependent on one centre has to be discarded as the form and life of the global suburb take shape through multiple centralizations and decentralizations. (Keil, 2018e: 496)

We argue that in addition to expanding our understanding of marginality, shedding light on socio-environmental processes linked to suburbanization and to new ‘spaces of extended urbanization’ can also go beyond ‘traditional’ research and political discourses on sustainability that focused on urban centers. Given that suburbanization has been ‘sold’ with nature in mind (Keil and Graham, 1998), a fresh political ecological reading of suburbanization is prescient as ‘the suburb’ is still at times understood as both a place of unsustainable sprawl, and a space of innovative responses to ecological problems (Alexander and Gleeson, 2018). Consider, for example, the way in which suburbanization conventionally implied that the city moves into, or closer to its spatial, natural environment. As the example of greenbelts or conservation areas beyond the urban edge shows, nature can be bounded in a process regulating land use. When Berger (2017) speaks about ‘belting future suburbia,’ we might add that the belting also works into the other direction: it belts natures as well. A ‘sociology of nature’ for the suburban planet needs to take into account that society now by majority takes shape in the sprawling regions of multiple densities that we call postsuburbia. We find at the urban fringe on one hand ancient land rights, rural remnants, agricultural residues, or previously uninhabited bush; on the other hand, we find the sedimented leftovers of industrial society, mines, old factories and other industrial installations that are being reclaimed by open landscape or incorporated into suburban space (Keil, 2018c), while the suburban fringe appears to Berger as ‘a no-man’s land of random, disaggregated and often uncomplimentary, informal and uncontrolled land uses’ (2017: 525), we know that both the suburban and the landscape beyond have been structured by generations or millennia of preceding human-nature interactions. To phrase it in these terms – ‘no-man’s land’ – might risk steamrolling over generations of human-non-human societal relationships with nature as well as the indigenous relationships to land that have existed there for a long time.

Sieverts, theorist of the inbetween city (2003), has given us an interesting perspective on the future of these lands. He notes that the *Zwischenstadt* may be the historico-geographic terrain on which new forms of ‘rurbanity’ might help sustain life on a planet of 10 billion. This would mean the ‘merging of urban and rural, of cultural and natural characteristics in this urbanization process’ (2017: 3) including an increase in food production, heightened contradictions of industrial agriculture with more diverse forms of cultures in and around cities, and the spread of ‘horizontal metropolises’ that will have to develop ‘their wildnesses, their areas of adventure and recreation, in themselves, as fractal urban landscapes’ (2017: 4). Sieverts ends with a (rhetorical) question: ‘Why should, under the constraint of inclusion into natural metabolisms, the greatest urban transformation in human history that we have sketched here not lead to fascinating forms of an urban-rural continuum, fascinating new urban landscapes’ (2017: 4; see also Keil, 2020). Sieverts adds that what has appeared rural and urban at the metropolitan fringe is now being redefined in an anthropocenic context. An apparent conversion is taking place where emerging suburbia and postsuburbia abuts a barren nature outside and a fertile nature inside: ‘compared to the open countryside, the city offers a protected and safe living space. The humans who live in the city do not represent a menace for plant and animal life. On the contrary, city dwellers tend to be environmentalists. Some of these activities, such as urban gardening, tree adoptions and bird nesting aids, or even the keeping of beehives, add to the quality of the biotope infrastructure’ (Sieverts, 2018).

As cities grow outward into a landscape of financialized and industrialized monocultural agriculture *à-la Blade Runner 2049*, the rich socio-ecological relationships that one would historically have expected to go beyond the suburbs, in the layered landscapes of the countryside, now move to the city itself which, especially in reaction to climate change, takes on certain aspects of ‘organic’ and collective organization. The chapter concludes with propositions to increase attention to areas described as ex-urban, peri-urban, and sub-urban, encompassed into a Suburban Political Ecology, can give us a better empirical and conceptual understanding of the production of new spaces of marginality and of new processes leading to environmental hazard.

## **Towards a situated more-than-urban political ecology**

Although Harvey (1996) correctly argued that ‘there is nothing unnatural about New York city’, there is nothing ‘natural’ about it either (Keil, 2003). Despite recent trends of urban ‘gardening’ or ‘agriculture’, cities will never be materially self-sufficient (McKinnon *et al.*, 2017) and will continue depending on the periphery



and generally the spaces that provide urbanism with its sustenance through ‘exploitation and exclusion’, as Ruddick’s (2015: 1122) ‘para-sites’ suggest. Hence ‘seeing like a suburb’ can become a new imperative for political ecology (Ekers *et al.*, 2012) and instead of considering airports, oil fields and garbage dumps as ‘non-places’ and seeing them from the inside outwards, we may begin with them and go from the outside inwards. Furthermore, ‘the anthropological machine reveals a discursive framing that structures the organization of the urban, not as a form but as an edge, an orientation, acting as a dividing line that operates both within the interiority of the urban and between the urban and its nonurban other’ (Ruddick, 2015: 1114).

Through developing a more-than-urban Political Ecology our concerns can include massive production sites, logistics ‘cities’, brutalscapes, deforestation, vast agricultural landscapes but also suburban residential sites, be it concrete high-rises or picket fenced homes. And considering how suburbanization has been targeted as an environmental catastrophe, it is not only poetic but imperative to become part of the solution and not the problem. As Loftus (2018) suggests to reconcile the planetary with the everyday, similarly Keil proposes (2020) to focus on ‘the quotidian revolutions in the sub/urban political ecologies of everyday life’ through which we can ‘reconcile seemingly opposing claims between situated UPE and the call for a post-cityist UPE.’ Here is where suburbanization (non-central urban expansion) and suburbanism (suburban ways of life) come together as distinct but inter-connected. ‘It is in the sprawl where sustainability, community and the urban have to be found. It is there where we locate and ultimately transgress the frontiers of urban political ecology’ (Keil, 2011b). This begins not with consensus regarding ‘sprawl’ and the unsustainability of suburbs but with acts of ‘dissensus’ as living indicators for tackling socio-environmental inequality (Kaika, 2017; see also Velicu and Kaika, 2017). After all, nowadays some of the most dynamic socio-political changes happen in the periphery (Caldeira, 2013; Hamel and Keil, 2015; Keil, 2013 and 2018d; Ranganathan, 2014; Ranganathan and Balacz, 2015; Roy and Crane, 2015).

‘What and who my communities are during one day and how they need to be sustained changes continuously. In order to find my way through those mazes of relationships, I need to start where I am and not in an imaginary place that is either reviled (like sprawl) or celebrated (like the compact city)’ (Keil, 2011b). Valdivia’s (2018) recent work is one such example that intersects periphery, everyday life and fossil capitalism with the embodied ecologies of an oil refinery city in which conditions of social and chemical toxicity characterize everyday life, but also where desires for social justice manifest through optimism and dignity. As noted in the introduction, our call for a more than urban political ecology also

aims to engage with calls to situate UPE (Lawhon *et al.*, 2014; Truelove, 2011; Loftus, 2012) and encourage a better focus on southern urbanisms (Lawhon, *et al.*, 2014; Truelove, 2016; Silver, 2017; Zimmer, 2010; Roy, 2009), the diversity of urban environments (Velzeboer *et al.*, 2018), and everyday practices (Truelove, 2011; Loftus, 2012; Birkenholtz, 2010; Simpson and Bagelman, 2018). As Kipfer (2009: 68) suggests: ‘The urban functions as a level of analysis mediating between macro- and microlevels of reality and possibility. In other words, the urban leads not only to analysis of the macrorealities of the state, capital and empire but also to a differential and dialectical critique of everyday life’.

There is no outside to the more-than urban continuum (Lerup, 2017; Newell and Cousin, 2015) and ‘we live, indeed, in a world of continuous massive sub/urbanization. There is no escape from it conceptually or materially’ (Keil, 2018b). Focusing on the more-than-urban therefore, we might find new openings and possibilities for engagement between human and more-than-human worlds. Yet, the multiplicity of the urban must guide us away from all-encompassing, perennial ideas of what the urban is and what it may entail (i.e. like the Anthropocenic approaches imply) (Ruddick, 2015). At its center (and its periphery), the question of the urban condition is a political question that we cannot afford to avoid.

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# 2

## The Urbanization of Beer, Brewing, and the Netherlands

### Introduction

This chapter uses the history of beer and brewing in Amsterdam, and the Netherlands<sup>1</sup> more broadly, to explore the socioecological configurations and transformations related to the region's urbanization, the formation of the modern Dutch state, and the development of commercial, colonial, and industrial forms of capitalist production. Much like water, a favored object of study in urban political ecology (Swyngedouw 2004; Kaika 2005; Gandy 2014), archaeologists have argued that the production, distribution, and consumption of beer has been a fundamental aspect of everyday urban life since the earliest cities (Hornsey 2003). Indeed, as I hope to show in this chapter, beer and brewing have played a particularly important role in the history of Amsterdam and the Netherlands. The development of commercial brewing, expanding trade and consumption of beer, and kinds of taxes and regulations that governments placed on beer was intertwined with processes of urbanization throughout the Low Countries. "It is in the history of Delft, Gouda, Haarlem, Leiden, Rotterdam, Amsterdam, Alkmaar

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<sup>1</sup> Note on terminology: The historical and geographical variation in names given to the area occupied by the modern nation-state of the Netherlands can cause some confusion (see Unger 2001, 2; Brandon 2011, 106). Historically, 'the Netherlands' and the 'Low Countries' have referred to the region that today includes the Netherlands (the Northern Low Countries), Belgium (the Southern Low Countries), and Luxembourg. This area was composed of a collection of provinces that were united and divided in various configurations by successive empires, conflicts, and confederations, including the Carolingian Empire, the Hapsburg Empire (the Seventeen Provinces), and the Dutch Republic (United Provinces). One of these provinces was Holland, where Amsterdam is located (now North Holland). However, the present-day Netherlands is also commonly referred to interchangeably as Holland in the contemporary English-speaking world and elsewhere. In this chapter I use Holland exclusively to refer to the province.



and a number of lesser centers,” Richard Unger (2001, 2) insists, “that the history of brewing is to be found.” Beer was particularly interrelated with Amsterdam’s early urbanization, setting the stage for its eventual development into a powerful center of commerce, ‘entrepôt of the world’, and colonial metropole.

As Jason Moore (2010b, 190) has pointed out, “the story of the Dutch economic miracle has been told often and well” (see Zanden 1997; de Vries and van der Woude 2009; Brandon 2011; Wallerstein 2011; Arrighi 2013), yet “it’s equally miraculous political ecology remains, however, largely hidden.” While Moore (2010a; 2010b) sets out to tell a *long durée* or world-systems history, in the vein of Braudel and Wallerstein, my ambitions here are far more humble. For one, my narrative is not based on original historical research as while my command of the Dutch language is more than adequate to order a round of beers at the café it is insufficient to read and analyze primary source documents, nor am I trained as a historian. Instead, I rely heavily on the English-language scholarship of historian Richard Unger, who has written two extremely detailed histories of beer and brewing in Europe (Unger 2013) and the Netherlands specifically (Unger 2001). Accordingly, my purpose is not to make novel historical argument but to set the stage for the chapters to come. Understanding the history of beer and brewing has a particular contemporary relevance in the context of the so-called ‘craft beer revolution’ (Garavaglia and Swinnen 2018), which is often portrayed as a backlash against the large-scale industrial brewing that came to dominate the 20<sup>th</sup> century through a return to small-scale and more ‘traditional’ brewing.

## Domestic and Monastic Brewing

The forms of brewing most common in northern Europe during the early and high Middle Ages were domestic brewing and monastic brewing. Before the eighth century, the area now known as Holland was sparsely populated by farmers, herders, and fishermen. Unger (2001, 11) presumes these households engaged in traditional brewing, though evidence is scant, as in the following centuries domestic brewing was certainly commonplace. Domestic brewing in rural areas, villages, and eventually towns and cities was often done by couples, with women playing an important role (Unger 2001, 16). While most households likely brewed for domestic consumption, in villages some are thought to have produced higher volumes to barter with or sell to other residents. However, most scholars consider larger-scale brewing in northern Europe to have begun with monasteries (Unger 2001; Hornsey 2003; Swinnen 2011; Unger 2013; Patterson and Hoalst-Pullen 2014; Cabras and Higgins 2018; Hoalst-Pullen and Patterson 2020). Monastic brewing involved better equipment and techniques than domestic brewing,

leading to a greater degree of specialization (Unger 2001, 11).

Monasteries, and monastic brewing, spread through northern Europe in the eighth and ninth centuries, with the expansion of the Holy Roman Empire. Whereas in southern Europe monks grew grapes and made wine, in northern Europe, monks instead grew barley and made beer (Poelmans and Swinnen 2011). The monastic mode of beer production entailed monks brewing for their own consumption as well for others. The consumers of monastic beer were pilgrims, the poor, and other monastery guests, all of whom likely relied on beer's nutritional value at a time when the average meal for common folk was a frugal affair. Fermented beer was also a healthier option than drinking the polluted water of the Middle Ages and some considered it to have medicinal properties. Both its nutritional value and its health benefits impacted beer consumption, and the importance of its production, long after the end of monastic brewing. Beer was considered a social and festive drink, which because of nutrition and health was not prohibited during fasting periods. While not primarily driven by commerce, some monasteries did produce beer for sale, either to noblemen or in monastery pubs. Outside of the monastery pubs, beer was widely available for free at festivities. Few had the disposable income to purchase beer and it was produced domestically. This meant there was little incentive for private individuals to engage in brewing for predominately commercial reasons. Monasteries had greater access to large grain surpluses than individuals or estates, allowing larger scale production. However, they still struggled to maintain production levels year-round and had limited capacity for storage, particularly during the fermentation period.

## Urbanization

From the early (400-1000) through the high (1000-1300) Middle Ages, the northern Low Countries were increasingly transversed, inhabited, settled, and transformed. According to van Bavel's (2011, 47) rough estimate, by 1300 the region was 10% urbanized. By 1600, this had increased to perhaps 40%, with Holland, which had remained predominately rural until 1300, astonishingly reaching an urbanization rate of approximately 60%. This made it the most urbanized region in Europe, surpassing the southern Low Countries and northern Italy.

The marshy and muddy region was made inhabitable through dyke construction, land reclamation, and waterway connections (de Vries and van der Woude 2009, 14). Land and water traffic increasingly passed through the northern Low Countries on its way to more developed economic centers, such as Flanders, Brabant, the Rhineland, and the Baltic coast's Hanseatic towns. A

number of outlets to the sea were also opened up, contributing to the emergence of port and trading towns along the network of waterways. Other settlements of various forms and functions were growing as well, contributing to a decentralized urban pattern. The physical geography continued to be transformed through dike construction and shoreline expansion in some coastal provinces. Holland and Utrecht, meanwhile, were characterized by extensive peat bogs. In the eleventh century, the provinces' Counts and Bishops began organizing reclamation projects to drain the peat bogs so that they could be used for cultivation, amongst other things.

The colonization of 'new land' through reclamation contributed to the undermining of feudal relations, which were uniquely weak in the northern Low Countries to begin with, especially in Holland (de Vries and van der Woude 2009, 17). Although embedded in hierarchies of territorial authorities, communities were often comprised of free peasants who maintained some control over their own affairs. Without the constraints of strong feudal relations, markets emerged particularly early in the northern Low Countries. Van Bavel (2010, 51) estimates that markets for goods and products existed in the region in the eleventh and twelfth centuries while markets for land, lease, capital, and labor developed in the following two centuries.

## Urban Commercial Brewing

Unger finds evidence that before 1300, the two largest towns in Holland, Dordrecht and Leiden, both had breweries. "Without doubt," he says, "commercial brewing in towns by individuals independent of any church connection was possible in Holland by the end of the thirteenth century" (2001, 15). The earliest urban brewers had likely been village or rural brewers and so their knowledges and practices were at first similar to domestic brewing. At first, many urban brewing operations may have been individuals brewing part-time or seasonally. Like domestic, monastic, and estate brewing, these individual workshop breweries were, at the most, semi-commercial – they may have produced surplus and income but not enough to fully supported the brewer.

Fairly quickly larger workshops emerged that had employees and operated full-time. These were commercial operations that required more substantial investments, larger volumes of raw materials, and networks and infrastructures for product distribution in order to be profitable. Taverns, public houses, and inns developed in tandem with commercial brewing. Some were literally connected to breweries; others were only connected by distribution contracts (Unger 2001, 25). To brew on a larger scale, greater specializations of labor and knowledge were

also necessary. Some of this, Unger (2001, 12) claims, early urban commercial brewers learned from the practices of monastic brewing.

Urban brewers also found themselves constrained by factors that were not significant for rural and monastic brewing, in particular the availability of space (Hornsey 2003, 274). Barley storage, malting facilities, and brewing kettles of the size needed for commercial production could not always fit easily in urban breweries. In some cases, the brewing process was distributed across multiple buildings, and even multiple individuals working in various degrees of integration. There was a tendency in the urban beer production to cluster operations together.

Urban breweries also came with some dangers, particularly the potential for fires because of the heat used to dry malt and boil wort. Town authorities attempted to mitigate emerging risks through regulations. For instance, Haarlem and later Amsterdam imposed limits on the equipment for drying malt in the 1300s (Unger 2013). There were social dangers as well. Drinking, drunkenness, and their consequences were, and have continued to be, causes for towns to question, debate, and regulate how, where, when, and what kinds of beer is sold (Unger 2001, 6).

One indication of relatively rapid expansion of commercial brewers, volumes produced, and the economic importance of beer trade in the Low Countries comes from what is now the province of Zeeland. In 1285, the commercial beer industry was already significant enough to inspire a local Count to plan a new town – Brouweshaven – that would concentrate it (Unger 2001, 15). While ultimately unsuccessful, it also indicates the close connections between the commercial beer industry, urbanization, and public authorities.

Regulation and taxation have bound the beer industry and public authorities together in particularly close configurations throughout their histories. “The law played a greater role in brewing than in almost any other industry in medieval, Renaissance, or early modern Europe” (Unger 2001, 377). The Low Country’s earliest tax regulations on beer date from the ninth century (Unger 2001, 3). With the development of urban beer industry, town governments increasingly took over the collection of brewery taxes from the counts and bishops who had collected them before. Through the relations and practices of taxation, processes constituting the beer industry and processes constituting urbanization were often interrelated.

Along with urbanization, brewing in Holland experienced rather rapid transformations approaching the year 1300; operations multiplied, concentrated in burgeoning urban centers, and were increasingly commercialized. In other words, a brewing industry formed. In the following century and a half, Holland’s beer industry played the role of massive importer and later exporter, developing

Amsterdam as its principal port. Trade and transportation networks were part of enabling these developments and were also generated and transformed by them. One of earliest Dutch industries, brewing may have been the first of the *trafieken* – the transformative industries historians consider to have provided foundations for the so-called ‘Dutch Golden Age’ (Unger 2001, 7; although de Vries and van der Woude 2009 do not list it as one).

## Amsterdam

In either 1300 or 1306,<sup>2</sup> a small and relatively newer settlement on the river Amstel was granted city rights by the bishop of Utrecht. The term *city* rights – which refers to a collection of privileges granted by a liege lord often encompassing a degree of self-government, a marketplace, and the establishment of guilds – is somewhat misleading as the area was sparsely inhabited. Amsterdam had perhaps 1000 residents, far fewer than the older settlements of Leiden (~3000) and Dordrecht (~5000) (Unger 2001, 23). Fishing and farming were likely the predominant subsistence activities, made possible by two centuries of small-scale reclamation projects that had turned peat bogs into cultivated land. A larger environmental project had been undertaken sometime in the previous century – Kahn and van der Plas (1999, 372) estimate the year 1250 – when the inhabitants of the area built a dam on the Amstel. The damming project had created an outer and inner harbor while the supportive dikes that were constructed organized land traffic and their banks provided substrate for buildings (Kahn and van der Plas 1999, 372). The dam served as the newly growing town’s central site – supporting buildings, a market, and allowing for the collection of a toll. In the earliest years of the 1300s, Amsterdam’s first brewery opened, followed shortly by the town’s first church (Unger 2001, 22).

## The Organizing Power of the *Gruitrecht*

Just as secular urban brewers adopted knowledge and practices from monastic brewing, public authorities applied the system of taxation they had developed for monastic brewing to the emerging commercial beer industry (Unger 2001, 12). This method was called *gruitrecht* – a collection of regulations controlling *gruit*, the most common additive used by brewers in northern Europe, and particularly the Low Countries, during the early and high Middle Ages (Unger 2013). It

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2 The municipality’s website claims the date cannot be determined.

provides a particularly clear example of how brewers, and others in the beer trade, were almost always acting within strict institutions and arrangements established by the government such that “the demands and needs of government had a deep and abiding effect on the industry” (Unger 2001, 377).

After malting and grinding the grain, soaking it in water and then extracting the wort, brewers boil the wort along with additives. *Gruit* was a mixture of vegetable matter that gave flavor to and helped preserve beer. Although its exact composition remains unclear and debated, and likely varied across space and time, the main ingredient was almost certainly bog myrtle. Various other kinds of additives for taste, color, and preservation were also used by brewers, however *gruit* appears to have been considered fundamental to producing quality beer. The use of *gruit* was not only driven by brewers’ knowledges and practices, the *gruitrecht*’s generation of revenues meant governments had a vested interest in the continued use of *gruit*.

The Carolingians and their successors asserted authority over unused lands, such as uncultivated areas of bog myrtle (Unger 2013, 32). The *gruitrecht* arose from the emperor’s monopoly on bog myrtle and thus on *gruit* preparation and sale. In setting the price of *gruit*, authorities effectively levied a tax on beer production. The emperor usually distributed (or farmed) the *gruitrecht* through grants to regional and local authorities, such as counts, bishops, monasteries, and towns. These public authorities, in turn, could grant *gruit* distribution rights to others, including laymen. *Gruithuizen*, run or sanctioned by public authorities, consolidated the preparation and sale of *gruit*. The counts of Holland and other counties in the Low Countries held the right to *gruitrecht* by the 1000s (Unger 2013, 33). These authorities strengthened their monopoly and power to tax by imposing regulations requiring *gruit* be used in brewing.

As a socioecological project, the *gruitrecht* organized human-nature relations at various scales. It promoted the exploitation of bog myrtle lands through particular social relations that contributed to the amassing of power and wealth of various authorities. It dictated, in part, the raw materials used by brewers and so limited the kinds and qualities of their products. It contributed to public authorities’ active promotion of urbanization and urban brewing as it was much easier to ensure collection of *gruitgeld* (revenue from selling *gruit*) from concentrated urban brewers who could be surveilled in ways that dispersed rural brewers could not (Hornsey 2003, 269). It also contributed to the spatialization of breweries and beer transport as *gruit* was not a particularly effective preservative, preventing longer distance trade. The required use of *gruit* by brewers in much of the Low Countries but not in Germany resulted in an uneven geography of brewing practices and products that served as a condition of possibility for the

Amsterdam-Hamburg beer trade. The *gruitrecht* had a number of powerful impacts on the circulation of beer; its influence continued to be felt even after it was no longer a primary method of levying beer taxes.

## The Amsterdam-Hamburg Beer Trade

German brewers, not confined in their practices or ingredients by *gruitrecht*, were able to experiment with and use additives other than *gruit* for flavor and preservation. Hops had been used, both in tandem with and instead of *gruit*, since early monastic brewing (Unger 2001, 27). Hops substantially improved beer preservation, making longer distance transportation and trade more possible and profitable. Still, the costs of transportation were high, especially as beer is a heavy good and not efficient to move by land. Port cities became increasingly important as beer could only profitably be transported by river and sea.

In the thirtieth century, urban brewers in northern Germany were particularly adept at producing hopped beers at commercial scales. The taste, and thus demand, for hopped beers also expanded amongst consumers in Germany, the Low Countries, and further. Over the next two centuries, Hamburg, Bremen, and Wismar became prominent brewing cities, exporting their product their products widely. Hamburg became known as the ‘Hanseatic League’s Brewhouse’ through the 1300s (Meussdoerffer 2009, 16). By 1376, nearly half of the city’s 1075 manufactures were brewers. With the growing popularity and export profits of hopped beer, hops were increasingly cultivated instead of collected in hop gardens around cities and towns (Meussdoerffer 2009, 17). Hamburg also became the European center of the hop trade.

Archival documents show that northern German hopped beer was being traded to and consumed in some Dutch towns by the end of the thirteenth century (Unger 2001, 27). That means that at least some northern Germany breweries were producing for export, there were trading routes between northern Germany and the Low Countries that could profitably transport a heavy liquid good like beer, and demand for imported hopped beer existed in at least some Dutch cities. Hamburg was regularly exporting its beer to Holland by the turn of the fourteenth century. In 1323, Count William III granted Amsterdam and Medemblik exclusive trading rights for all beer imported from Hamburg; meaning any Hamburg beer that entered Holland had to go through one of those cities and pay the toll there (Hornsey 2003, 17; Unger 2001, 32). This kind of trade strategy was meant to gain some control over the import of foreign goods, to benefit the cities granted the exclusive toll rights, to disrupt trade to the southern Flemish cities, and to enrich the province’s tax collection (Unger 2001, 30). For Amsterdam, still a



relatively newer and smaller town, the guaranteed circulation of a taxable import good through her port “may not have been the reason for the rise of the town to commercial and eventually political prominence but the trade in beer was critical to the early development of her trading relations” (Unger 2001, 32). Beer import toll revenues were not the only advantage, Hamburg traders arriving by sea stopped first in Amsterdam along with other goods they were carrying and their disposable incomes. From Amsterdam, in-demand Hamburg beer continued to circulate through inland trading routes. In this way, Amsterdam became a hub for various trade networks, facilitating further circulations of goods and wealth.

By the time Count William V renewed the toll in 1351, only Amsterdam was mentioned as a port of entry as it had been clearly preferred to Medemblik (Unger 2001, 32). The city had also grown from one of Holland’s smallest towns to perhaps it’s fifth largest. In a further boon to the city’s role as a privileged nexus of beer circulations, William V also decreed that only locally brewed beer could be drunk in northern Holland, except in Amsterdam. By reorganizing foreign hopped beer’s circulation this way, the Count allowed Amsterdam to continue benefitting from the trade while also providing local breweries some protection from Hamburg’s competition. Still, the trade was significant for both cities. By value, beer accounted for one-third of all Hamburg’s exports in 1369, and 47% of the city’s beer exports went to Amsterdam (Unger 2001, 28). Furthermore, the Amsterdam-Hamburg beer trade was important across the Low Countries. Records from Dordecht’s toll, where some beer passed after Amsterdam, show that between 1380 and 1385 the value of the imported beer was equal to 50% of imported wheat and 20% of imported rye. At the turn of the fifteenth century, beer’s continued circulation southward from Amsterdam to the southern Low Countries was an integral part of Dutch trade (Unger 2001, 31). Importantly, the permeation of trade and cities in northern Europe with Hamburg beer fortified a demand and market for hopped beer that the Dutch would take even greater advantage of shortly.

The circulation of Hamburg beer through Amsterdam remained significant into the mid-1400s. As the flow of beer from Hamburg to Amsterdam declined in volume, perhaps more interesting is how the import of beer to Amsterdam declined in relative importance. Through the trading and transport networks of the Hamburg-Amsterdam beer circulation, more goods arrived into Amsterdam’s ports.

## From Gruit to Hops, From Gruitrecht to Excise Tax

Holland’s regulations requiring the use of *gruit* by its breweries were actually

repealed around the same time that Amsterdam-Hamburg trade picked up. However, this wasn't met with a rapid shift but a slow transition. Dutch brewers generally took their time shifting their production from *gruit* to hops for a few reasons. At first hops were not as available and affordable. Furthermore, transitioning away from *gruit* brewing would mean having to learn a new brewing process that would likely require experimenting to maximize quality. Since the markets were already flooded with hopped beer from Hamburg that was high quality and well known, financial success seemed even less likely.

Hop cultivation did begin around Kampen, Gouda, and Breda in the early fourteenth century and as demand increased it spread to other regions as well. By 1360 tax records indicate that hop beer production was rising steadily in the Low Countries. As output and quality increased, breweries began to sell their hopped beers, first to neighboring markets and eventually more widely (aided in part by lower transportation costs and taxes), including the southern Low Countries, Germany, and England. Dutch hop beers became prominent in the international markets. The Dutch transition to hop production was more or less complete in the early 1400s, making the Low Countries a force in the international hop trade. Brewing hopped beers became an increasingly critical industry to Holland's economy, one that mixed imported raw materials with local ones and local labor and then exported a substantial amount of the product (Unger 2001, 60).

The problem with allowing brewers to use hops was that the declining use of *gruit* meant decreasing revenue from the *gruitrecht*. It was not the Count who first felt the impact of this, but the dispersed network of tax collectors the *gruitrecht* had been farmed out to. This was remedied in 1321, when a decree that brewers in Holland using hops would have to pay a fee equivalent to what the *gruitrecht* would have cost had they been using *gruit* instead (Unger 2001, 33). It was explicitly stated that tax revenues from beer production were not to diminish simply because practices and ingredients had changed. The institutions of the *gruitrecht* were to remain as well, with *gruithuizen* now selling hops as well as *gruit* (Unger 2001, 41). Brewers could, however, buy hops elsewhere but they still needed to visit the *gruithuis* to pay the tax.

In the fifteenth century, taxes based on the specific ingredients used in brewing were replaced in most Dutch towns and counties with excise taxes (Unger 2001, 53). Usually, one levied on production and one on consumption. While the reliance of excise as the main source of tax revenue was new, excise taxes themselves were not. Certain towns had been given the right to levy excise tax in the past; Haarlem, for example, received the right charge excise on beer in 1274 (Hornsey 2003, 270). Amsterdam had been charging excise tax on wine and beer since the mid-fourteenth century (Unger 2001, 54). As with the *gruitrecht*, town

governments engaged in various practices to try and ensure all taxes were paid in full. In Amsterdam there was a structure for the tax officer in front of every brewery to surveil each payment (Unger 2001, 149). Other tax collectors had sheds on the quays to watch the boats go by and check that the proper import taxes had been paid.

Around the same time as the increasing use of hops, brewers also adopted the use of copper kettles and brick ovens (Unger 2001, 41). Brewers use of larger kettles made the brick ovens that could fit them necessary. The new technologies meant brewer investments increased, as did their production, and so did specialization. The stages of the beer production process became increasingly separated in time and space with the use of hops, which required a division between two processes that before had not been necessary. Larger equipment may also have led some urban breweries the further divide the steps of the processes into separate buildings.

## **Holland's Export-Oriented Beer Industry**

By 1380, following the transition to hopped beer production, the brewing industry in the northern Low Countries began a period of growth that continued through the mid-fifteenth century (Unger 2013, 88). Brewing was increasingly a professionalized and commercialized activity and most towns had established geographies of commercial distribution, including taverns and supply networks (Unger 2001, 25). Holland's brewers benefitted from ever more extensive trade networks, which both supplied raw materials and provided access to more markets for sale. Unger (2001) describes this as the development of a 'mature brewing industry', which formed the basis for what he calls the 'Golden Age of Dutch Brewing' from 1450 to 1650. During this period, according to Unger, brewing occupied its most substantial economic position and contributed to the facilitation of other industrial and trade expansion as the Dutch entered their so-called 'Golden Age' of the seventeenth century (Unger 2001, 69).

The production outputs of brewers in Holland climbed through the fourteenth century and then more rapidly rose towards the century's end and through fifteenth century (Unger 2001, 55). As the volume and quality of hopped beer produced in the northern Low Countries increased, they were able to replace imports from northern Germany with domestic production (Muessdoerffer 2009, 20). In Holland, the scale of the beer industry continued to expand, becoming increasingly export-oriented. Delft, Haarlem, and Gouda had grown into Holland's predominant brewing centers in the fifteenth century (Unger 2001, 73). By van Bavel's estimates (2010, 56), in 1400 they produced 30 million liters and

by 1570 they were producing 100 million liters. Unger (2001, 73) suggests even higher volumes, surpassing 100 million liters by the turn of the sixteenth century. The vast majority of this beer was produced for export, only around 7% was consumed in the same towns.

Other places within the northern and southern Low Countries served as the markets for much of these cities' exports (de Vries and van der Woude 2009, 275). Internationally, Holland's hopped beer was also exported to markets in northern Germany, France, Scandinavia, and England (Muessdoerffer 2009). It remains unclear whether, and how much, these new circulations of beer flowed through or otherwise interacted with Amsterdam. Beer produced in Gouda and Delft was unlikely to have physically passed through Amsterdam in substantial quantities as their production was focused on southern markets (de Vries and van der Woude 2009, 275). Haarlem, on the other hand, exported to northern markets and its proximity could mean that Amsterdam was a part of its beer trade.

Trade with the southern Low Countries was particularly important to Holland's export beer industry, just as it had been to the previous trade from Hamburg. In the 1540s, the southern Low Countries imported 3 million liters of beer annually from Holland; all other foreign imports amounted to less than 12% of Holland's (Unger 2001, 73). The massive volumes and scales of brewing in Holland during the period also required tremendous amounts of energy. In Haarlem, between 1510 and 1528, the city's breweries "consumed twice as much peat as all the city's households combined" (de Vries and van der Woude 2009, 339). Rising labor productivity also played an important role in the beer trade's expansion. Holland began the sixteenth century with 377 urban breweries that each had about 10 workers, it ended the century with 187 urban breweries that each had about 16 workers but produced the same volumes or more (van Bavel 2010, 56). Van Bavel emphasizes that this process likely resulted in some unemployment by closing small and rural breweries. While Unger (2001, 104) emphasizes that breweries employed 4% of Holland's workforce in 1514 and that they continued to be important employers through the sixteenth century.

Amsterdam entered the 'Golden Age of Dutch Brewing' a place of beer exchange and consumption. It was home to few breweries and the source of little beer production. In the first half of the period, Amsterdam's beer imports rose, leading the establishment of new and larger facilities where beer entered the city in 1621 (Unger 2001, 87). In the second half, beer production expanded as well, increasing nearly threefold from the mid-sixteenth to the mid-seventeenth century (Unger 2001, 80). Still, its output was far lower than the major export cities in the seventeenth century and it had few breweries than other much smaller towns in Holland (Unger 2001, 87). The city's population also grew, surpassing 100,000

at the end of the sixteenth century (Unger 2001, 95).

Excise taxes on beer, wine, and grain were the biggest sources of income in the 1550s, with 70% coming from the tax on beer (Unger 2001, 69). This accounted for 55% of the Amsterdam's income. By 1650, Amsterdam had become a more important brewing center, and along with Haarlem and Rotterdam, accounted for more than 50% of all of Holland's beer excise tax (de Vries and van der Woude 2009, 320).

How was this transformation of Holland's brewing industry possible? Population growth, transport routes, cheap fuel, the grain trade, generally increasing prosperity, higher working-class wages, technological advances, high consumption level, and the expanding maritime trade manned by thirsty sailors are all regularly invoked in historical articles and, I don't doubt, played a role. However, in trying to understand the circulation of beer as itself a socioecological project (not simply an economic circuit with social and ecological causes and consequences), I'm inclined towards a theory called the 'urban-agrarian symbiosis' that comes from the 'transition to capitalism' literature.

## The Urban-Agrarian Symbiosis

The Dutch regularly play a role in historical studies of the transition to capitalism; particularly the province of Holland and the city of Amsterdam. But what exactly that transition is, how it happened, and whether the Dutch were 'fully' capitalist is endlessly debated. Some of the most well-known academic accounts of the transition to capitalism emphasize the role of Dutch trade, based in Amsterdam (Braudel 1992; Arrighi 2013). Others, emphasize agricultural transformations (Aston and Philpin 1985), still others focus on industry and proto-industries (de Vries and van der Woude 2009; van Bavel 2010), and finally others explore the relation between public office and wealth (Wood 2002). It seems to be increasingly argued and accepted by economic historians that the Dutch Golden Age – whether considered fully capitalist or not – was no sudden transformation or clean break but instead made possible by a number of developments in the Middle Ages (B. Van Bavel 2010; Brandon 2011). In contrast to well-known arguments about the importance of urban centers and trade, Brandon (2011) argues for an emphasis on the interconnections between trade and production and on the particular development of a productive base in the Low Countries, especially Holland. However, while scholars making similar arguments have focused on transformations to rural production, Brandon insists on an urban-agrarian symbiosis.

From the ninth through the fourteenth century, the inhabitants of the Low

Countries engaged in projects of land reclamation and peat mining that massively transformed the region's socioecology. Land was made inhabitable and cultivatable through land reclamation, but over time the soils were demolished and the land was destabilized to the point of sinking back into the sea. In Holland, the lowering of the water table through land reclamation and drainage practices resulted in a dangerous subsidence problem as the drained peat was aerated, causing it to oxidize, compact, and sink (de Vries and van der Woude 2009, 18). Compounding matters, dry peat could also be dug up to use as cheap and abundant fuel. Not only was it exploited for households and local industry, it was increasingly harvested for export to urban markets – precisely this peat harvest energized Holland's beer industry (as de Vries and van der Woude 2009 also argue). Digging up peat contributed to the deterioration of dykes and other flood prevention structures and left the land increasingly vulnerable to erosion and flooding. Holland's increasingly deteriorated and sinking land led to declining agricultural productivity and production. Rural subsistence and profits achieved through agriculture and peat mining gave way to a socioecological crisis that acted "strikingly analogous to 'the so-called primitive accumulation' that deprived agricultural producers of their land in England" (Brenner 2001, 208).

By the fourteenth century, an unfortunate 'treadmill of drainage' had been set into motion (de Vries and van der Woude 2009, 19). A socioecological crisis of this magnitude could have easily resulted in Holland's depopulation, but it didn't. Instead:

An economic redirection started towards commercial farming, largely the keeping of livestock for the production of butter and cheese, and, to a lesser extent, the cultivating of 'industrial' products such as hops (for brewing) and hemp (for rope-making), linseed (for oil) and madder (for dyestuffs). Although peasants remained in control of their small tracts of land, natural circumstances increasingly forced them to combine labour-intensive forms of agriculture with wage-labour in export-oriented fishing, peat-digging and dike-building, proto-industrial activities in rural areas or manufacturing-work in the towns. (Brandon 2011, 121)

In other words, failing subsistence agriculture (based on cereals) was replaced with labor-intensive commercial agricultural practices. This required three conditions of possibility. First, the ability (knowledge, practices, finance) for sophisticated water management. Indeed, already systems of dikes, polders, pumps, and windmills were invented and constructed to improve drainage, combat sinking, and protect low-lying communities. Collective drainage authorities were

already established to organize investment into and coordinate such projects. Second, the possibility to import basic foodstuff, as the commercial agricultural practices would not provide direct subsistence. Grain was imported into Holland, eventually developing into the Baltic Grain Trade. Rural and urban were necessarily, and increasingly, connected with each other and inter-regional trade networks. This had the important effect of bringing urban and rural production, exchange, and consumption into closer relation (Brandon 2011, 122). And third, unable to exercise political control over the countryside, urban merchant-entrepreneurs economically invested in rural industries. The urban investors gained control over more production, while sustaining the rural commercial agriculture industries, but also creating the potential for full proletarianization as peasants were no longer in control of their own means of production.

Through this particular urban-agrarian symbiosis, understanding of the beer industry and trade expansion is deepened. Foremost, Holland's brewers were involved in both enabling and taking advantage of all three conditions of possibilities. They invested in rural water management projects (Unger 2001, 107), they contributed to the development of the grain trade (Unger 2001, 99), they invested in rural industries (Unger 2001, 107), they consumed commercial agricultural products, and they hired urban migrants. The commercialized circulation of beer was one process, of many, that mobilized the conditions of possibility for the urban-agrarian symbiosis and thus the emergence of the 'Golden Age,' although its role is sometimes overlooked. Its contribution though lies not just with beer's increasing commercialization and urbanization, but fundamentally with the shift from *gruit* to hops. With this restructuring of the brewing process and the constitutive flows of beer's metabolic circulation, Holland's breweries were able to benefit from the commercialization of agriculture and compete inter-regionally. As Marx asserts, great revolutions in trade can only occur where changes in the field of production have already begun. Through the lens of the urban-agrarian symbiosis, the circulation of beer's relation to proletarianization as a socioecological process also comes into sharper focus. Importantly, it also shows that while the development of urban brewing and the commercialization of brewing went hand in hand, these were not processes happening *in* regions, countryside, or cities, but the very process of producing regions, countryside, and cities.

Brandon makes the following illuminating points. First, although the Dutch trajectory was driven by changes to production (manufacturing, fishing, agriculture) *together with* merchant capital, the core capitalist class remained focused on trade (2011, 141). This led them to choose financialization over restructuring production when outcompeted internationally. This might have been



the case for the brewing industry from the seventeenth into the eighteenth century, which essentially shut down in many cities instead of attempting to become more competitive. Second, both urban middle classes and capitalist-class run federal state preferred policies characterized by absent national protectionism but strong local protectionism in response to competition. This dynamic also animated the spatialities of beer production-exchange-consumption:

Towns in Holland also added to their taxes higher levies on beers from elsewhere to promote their own industries. The first signs of protection of local brewing appeared soon after the adoption of hopped brewing. One reason was the potential for expansion of local brewing. Another, and probably more pressing, was the great success of certain towns such as Delft, Gouda, Haarlem and Amersfoort in producing hopped beer which flooded the Holland market and threatened, in the first instance, local producers in other Holland towns. (Unger 2001, 42)

## **The Baltic Grain Trade**

Without the import of foreign grain, the transformation of Holland's agrarian sector would have been impossible (Moore 2010b, 197). Already unable to produce sufficiently high yields of staple grains in their deteriorated rural lands, the import of foreign grain allowed Dutch farmers to shift to cattle, dairy, and other high-profit pursuits. Baltic grain was certainly imported to Holland in the fourteenth and fifteenth centuries, however it was only one source of many. From 1500 to 1550, the export of cereals from the Baltic had increased four times in volume, much of it transported in Dutch boats going through Amsterdam (van Tielhof 2002, 43). The semi-colonial relation between the Dutch and Poland kept grain prices down, a good thing for brewers. Fluctuations in the grain market directly impacted brewers in terms of price but also because in times of shortage restrictions would be imposed to guarantee enough grain for bread production (Unger 2001, 93).

## **Funding the Dutch Revolt (1566–1648)**

Wars characterized the 'Golden Age of Dutch Brewing,' impacting the beer industry's 'raw material supplies, prices, and distribution' (Unger 2001, 71). However, left out of many historical accounts is the fundamental role of beer in financing the Revolt against Habsburg rule and the ensuing 80 Years War

(Deconinck, Poelmans, and Swinnen 2016) – as it was many towns “most important single source of income” (Unger 2001, 71). Beer taxation’s importance is demonstrated by the regular increases imposed. Holland had already more than doubled its beer taxes by 1579 when a general tax on beer was established for all seven provinces of the Dutch Republic. While brewers’ taxes were drastically increasing, some did also benefit from the consolidated markets that the amassing of armies produced.

Deconink, Poelmans, and Swinnen’s (2016) detailed analysis shows that during the 80 Years War, beer accounted for 31% of Holland’s excise revenues and 18% of total revenues, making it one of the largest sources of income and approximately equivalent to the estate tax. The importance of beer to everyday life, its commercialization, and the development of an efficient system of tax collection contributed to the Dutch Republic’s ability to fight a more geopolitically prominent foe for 80 years.

## **Inter- and Intra- Province Competitions**

Although Dutch beer is lauded for dominating the international market during this period, the singularity of ‘Dutch beer’ obscures contested multiplicity. There was competition within the northern Low Countries – already a dubious equivalent with ‘Dutch’ – between urban and rural brewers (Unger 2001, 378). In the fourteenth century, urban brewers were generally producing ‘notably superior’ quality beers than rural brewers and in larger quantities (Hornsey 2003, 271; Unger 2001, 182). Rural brewers did enjoy some advantages, most importantly cheaper property and they weren’t subjected to taxation by the urban authorities (Unger 2001, 182). In the fifteenth century, a combination of rural brewers’ improving skills and increasing urban taxes made their products’ qualities and prices more competitive. Urban brewers more direct access to foreign raw materials and economies of scale were no longer able to keep their prices low enough to dominate rural markets, which they increasingly had over the past century (Hornsey 2003, 271). Urban distributors and sellers suffered as well. One strategy was to petition higher authorities for assistance – sometimes the same authorities that had raised their taxes (Unger 2001, 189). Amsterdam’s beer industry had some success, the government prohibited brewing within a quarter mile of the town in 1413 and Duke Phillip decreed that beer consumed in the same radius was subject to civic excise taxes in 1452 (Unger 2001, 182). Across Holland, it appears that towns regularly prevailed when tensions with the rural beer industry came to a head, yet rural brewers persisted (Unger 2001, 189). In addition to the rural beer industry, town and provincial authorities in Holland

were concerned with urban household brewing, again because of possible tax revenues. Amsterdam attempted to institute and collect taxes on home brewing, but eventually outlawed the practice instead (Unger 2001, 147). In the 1580s, home brewing was outlawed in all of Holland by the province government.

Inter-province and inter-urban competition could be considered both more significant to the trajectory of the Dutch beer industry and more apprehensive that there was a trajectory (singular) of the Dutch beer industry (singular). Yntema's (2012) reconstruction of the beer trade between provinces shows how fragmented authority, rivalry, and uneven industrial geographies led the provinces to exacerbate the decline of the Dutch beer industry. As the profitable Flemish export markets was lost going into the seventeenth century, Holland tried to compensate by exporting within the Republic. Concerned Holland's imports were undercutting their own less-developed brewers, some provinces raised their taxes on beer from Holland. A chain reaction of retributive tariffs was set off, at the provincial and urban level, that contributed to overall decline. Increasingly shut out of neighboring local markets and less and less competitive on the international market, few breweries, cities, or provinces could profitably produce for export. The geography of consolidated, large-scale, specialized breweries that once flooded the international market with 'Dutch beer' transformed into a dispersed geography of small-scale breweries producing for local consumption.

## **The Circulation of Beer and Amsterdam's Urban Form**

The massive, commercialized circulation of beer, and its reverse circulation of capital, through Holland was implicated in numerous urban transformations. Most obviously, the beer industry required buildings and infrastructures for each moment of circulation. Breweries tended to concentrate in particular neighborhoods or on particular waterways (Unger 2001, 83). In Amsterdam, the Brouwersgracht (Brewer's Canal) was rapidly developing by the early seventeenth century. This involved more than the construction of breweries, the brewers themselves lived there and contributed to the neighborhood economy with their growing incomes.

Concentration on waterways meant that breweries were major polluters, exacerbating water pollution problems from the Middle Ages that were only worsening as population densities increased with urbanization (Hornsey 2003, 274). Polluted waterways may have still functioned for the transport of raw materials and products, but breweries also required supplies of clean water. Hornsey (2003, 273) claims beer import toll revenues were used by governments to finance drainage projects and waterway maintenance. Amsterdam's wealthy merchants were certainly known to invest in reclamation projects outside of the

city, such as the drainage of Beemster lake. Abrahmse (2010, 185) considers how a ‘major part of the Dutch landscape has been planned from the cities’ and that many large reclamation projects were ‘essentially urban phenomenon’ requiring organization, techniques, and financing ‘dependent on urban knowledge.’ Unger (2001, 69) suggest that brewers were important participants in their towns’ economies through investments, but he gives trade and fisheries as examples. He also mentions that the prosperity of the beer industry generated outside investment in relevant ‘physical and human capital’ such that ‘buildings and experienced labor were almost always available’ (Unger 2001, 107).

## The Circulation of Beer and Class Formations

As a project of class formation, the commercialized circulation of beer in the Low Countries finds some roots in estate brewing (the production of surplus; the reproduction of seigneurial relations) and monastic brewing (production organized by class). Commercial urban brewing, ‘from the earliest days... created a class of entrepreneurs with a prominent place in public life’ (Unger 2001, 384). Burgermeesters and merchants commonly owned Amsterdam’s breweries (de Vries and van der Woude 2009, 319). In Rotterdam also, brewers were “often holders of the highest public offices” and sometimes described to have “their pompous lifestyle” (Unger 2001, 384). In Holland as a whole, a document from 1742 lists brewery owners as regents, merchants, and soap boilers “enjoying some of the province’s highest average incomes” (de Vries and van der Woude 2009, 319). Rural breweries also contributed to the reproduction of a prominent class, sheriffs and judges are mentioned as prominent owners (de Vries and van der Woude 2009, 319).

Breweries, it seems, were often owned by the already wealthy; likely related to the considerable initial investment required. As the above list of common owners clearly demonstrates, brewers and breweries also tended to have particularly close relations to various public authorities:

In many cases brewers were part of government, or at least of civic government, in northern Europe from the fourteenth century on. Town councils in almost every sizeable town in northern Europe would have typically counted at least one brewer among their number. Brewers were habitually important figures in town politics as members of the magistracies, as executives, and as tax collectors. The frequency of brewers taking such positions can be explained by their prosperity and by their being tied to the town, not traveling. In part, though, the frequency of public service must also be explained by the mutual

interest of public authorities and brewers in the profits of selling beer. (Unger 2013, 10)

Clearly, commercialized brewing in the Low Countries through at least the eighteenth century contributed to the reproduction of wealth and power differentials, despite the supposed decline of the industry. Breweries later served similar purposes in the nineteenth century and beyond (Heineken, etc.). They served also to reproduce the working class, through complacency in processes of proletarianization, substantial wage-labor employment (Unger 2001, 105) and the increasing division of labor. Consider the following description of the wage fluctuations amongst beer industry workers. I find most striking not the yo-yo-ing of wages, but the division of work into numerous seemingly unskilled tasks:

The complexity of the work affected the wage rate as did the physical strength required to carry it out. The men who moved the beer in Haarlem in 1519 were paid more than twice the wage of the women who worked in the brewery. By 1550, though, the relationship had changed and women were getting a wage a bit more than 5% better than the men who shifted the beer. The man responsible for looking after the yeast and its proper action got only 20% of the amount paid to a woman worker in the brewery. That had fallen to 10% by 1575 though all the other wages remained the same. Some of the women were typically responsible for overseeing the cooling of the beer. They were paid twice the amount earned by women who stirred the mash and the hot water with large oar-like paddles. Both relative wages and absolute wages were deeply affected by the prosperity of the industry. When brewing went through a time of contraction, as it did in Haarlem through the middle of the sixteenth century and the Revolt, wages were stable or falling. Periods of expansion brought better times for workers and possibly improvements for the lowest paid and least skilled. (Unger 2001, 103)

The reproduction of owners and workers through the brewery is one aspect of the commercial circulation of beer. It is worth re-mentioning van Bavel's (2010, 56) description of Holland's increasing labor productivity in breweries as similar to 'proletarianization' in the way it closed other smaller and rural breweries (see also Unger 2001, 105).

On a grander scale, if the argument I've laid out in this chapter is accepted – that the circulation of beer was instrumental to Amsterdam's urbanization and role as a center of commerce – than beer's internal relation to macro class formations is an open question, even though it clearly neither caused nor determined them.

At the “zenith of its commercial greatness,” writes Marx, “the total capital of the [Dutch] Republic was probably greater than that of all the rest of Europe together.” But at the same time, “the people of Holland were more over-worked, poorer and more brutally oppressed than those of all the rest of Europe put together” (Marx 1887, 918). Van Bavel (2010, 73) provides complimentary statistics:

In 1630, a third of the taxed wealth in [Amsterdam] was in the hands of the richest 1 percent. The Gini coefficient (a measure of inequality, with 0.0 indicating full equality and 1.0 full inequality) in 1585 was around 0.74, but in 1630 it had already increased to 0.85: one of the highest figures in pre-industrial Europe... A large share of the people in seventeenth-century Amsterdam had become totally pauperized. The splendour of the Dutch Golden Age to a large extent was at the expense of the lower middle classes and the upper lower classes, who sank to ever poorer substrata.

## Consolidation and Industrialization

At its low point, in the 1840s, Amsterdam had only three breweries, down from 7 three decades earlier (Unger 2001, 351). However, Amsterdam’s remaining breweries fared better than many others thanks to the large market provided by the East India Trading company (Unger 2001, 227). From 1650 to 1805, Amsterdam’s excise tax income from beer accounted for 36% of Holland’s total (Unger 2001, 230). The total, however, decreased substantially in the same period, producing only about a quarter of the revenue in 1805 that it had in 1650. Accordingly, the industry’s importance to towns decreased not only economically but also in representation in government and other positions of prominent and authority (Unger 2001, 243).

The mid and late 19<sup>th</sup> century, however, was marked by a number of important developments for brewing, particularly in Amsterdam. The railroad network, spreading out from Germany, reached Holland in 1856, a particularly promising transportation revolution for bulky goods like beer (Unger 2001, 359). At the same time, there was increasing pressure to restore beer as the people’s drink (Unger 2001, 348). Poor urban nutrition led to a medicalization of beer, proposed as an antidote. Housing and infrastructure were crumbling while almost half the population was registered as indigent and destitute. Gin consumption had become not only popular, but particularly visible. It was in this context that Gerard Adriaan Heineken, in 1863, purchased the existing Den Hoyberch (The Haystack) brewery, founded in 1592 (Smit 2014). After doubling the brewery’s sales his first year in charge, Heineken was ready for further expansion. In 1867,

he purchased property for a larger plant, constructing the building that currently houses The Heineken Experience. The Royal Netherlands Bavarian Brewery opened as Heineken was taking off, and in 1871 so did the Bavarian Brewery de Amstel (Unger 2001, 365). The breweries would shape the Amsterdam in various ways, including building water pipes from Harlem and investing in other public construction projects and canal works (Unger 2001, 368).

Refrigeration, steam power, and glass bottles all transformed industrial brewing in the 19<sup>th</sup> century. Among other things, they enabled a greater degree of standardization in the brewing process. Louis Pasteur's fermentation research in the 1870s provided further breakthroughs, allowing scientific yeast selection (Unger 2001, 357). Electricity, refrigeration, and knowledge of yeast selection transformed the brewing process, allowing it to happen regardless of season and the products to be stored long-term. In 1886, Heineken had a laboratory that was producing its own cultured yeast and selling it to other brewers (Unger 2001, 369). The end of the 19<sup>th</sup> century was marked by a rise in the production and consumption of beer in Holland and Amsterdam's Bavarian beers were increasingly popular internationally as well. Exports climbed from 93,700,000 liters in 1870 to 314,200,000 liters in 1890 (Unger 2001, 366). Still, the Dutch beer industry was not nearly as strong as it once had been, although it was able to increase production enough to cut imports and sharply increase exports, improving its trade balance (Unger 2001, 367).

In the early 1900s, beer gardens became popular and consumption was increasing (Unger 2001, 370), along with the urban population and the suburbanization of the surrounding areas. Amsterdam's population grew from 500,000 to 700,000 between 1910 and 1925. Amsterdam, in 1900, was home to only seven breweries, but four of them had more than 100 employees and in Rotterdam there were two such large firms (Unger 2001, 373). Meanwhile, more than 200 breweries closed in the Netherlands between 1850 and 1910 (Unger 2001, 374). With the breakout of WWI, beer production went into decline as ingredients became less available and more expensive and consumption was reduced (Unger 2001). WWII and the Nazi occupation kept beer production in stasis, amongst innumerable other more horrific consequences. In the post-war period production picked up again, with large multi-national breweries increasingly dominating the market. Technological innovations in brewing and transportation – the metal can, for instance – allowed for a drop in prices and increasing consumption (Harvey 2014, 194).

## Craft Beer Revolution

In the 1980s the Dutch brewing industry had consolidated itself into 13 industrial



multinationals, compared to the hundred that were brewing decades before (Dijk, Kroezen, and Slob 2018). But then, a resurgence. One that is still exuberantly bubbling. In the past two decades hundreds of breweries have opened in the Netherlands and an explosion of styles has ensued. The number of Dutch breweries surpassed the number of Belgian breweries in 2015, after 100 years behind (Dijk, Kroezen, and Slob 2018, 18). Over the last three decades, the beer industry in the Netherlands has continued to undergo substantial changes. This is according to governmental and industry reports (Europe Economics 2016; Loretz and Zwirn 2015) and has also been widely represented in more popular media coverage. In terms of volumes sold, many traditional beer drinking markets are in decline (such as UK, Germany, Belgium, Netherlands, Czech Republic, Ireland, Denmark), while others are experiencing substantial growth (namely China, Brazil, South Africa) (Cabras, Higgins, and Preece 2016, 16). In the Netherlands this has meant a decline from approximately 13.5 million hectoliters sold in 1995, to 11.7 million hectoliters in 2013 (Loretz and Zwirn 2015, 1). Although this may be rising again, with an estimated 12 million hectoliters sold in 2016 (de Jongh, van Teeffelen, and de Kruijk 2016).

These changes are not experienced evenly across the beer market. For instance, in the Netherlands both the demand and supply of craft beers is increasing. Since 2012, the number of breweries in the country has increased from 165 to more than 400 (de Jongh, van Teeffelen, and de Kruijk 2016), largely accounted for by new craft breweries. According to the National Beer Survey Netherlands 2016, the majority (78%) of its 1000 survey participants drink craft beer, not necessarily exclusively, and the same percentage report noticing a greater variety of beers on the market. Nearly 60% found this greater beer diversity in supermarkets appealing while almost 50% said it's important that bars and restaurants offer a variety of beers.

According to a 2016 report by The Brewers of Europe and Europe Economics, the Netherlands exports nearly 60% of its beer production (Europe Economics 2016). The beer industry – including retail, hospitality, supply, and brewing sectors – accounted for approximately 65,000 jobs in 2016 (de Jongh, van Teeffelen, and de Kruijk 2016). The industry is also a substantial source of tax revenue (Cabras, Higgins, and Preece 2016, 24). This accounted for €2.14 billion in government revenues in 2016, of which €451 million came from excise duty (de Jongh, van Teeffelen, and de Kruijk 2016).

The industry trend in the Netherlands, from the 16<sup>th</sup> through the 20<sup>th</sup> century, was concentration (Unger 2001, 373). Even during periods when new breweries were opening, production volume was often concentrated in a few large firms. Holland's small breweries often turned to a strategy of low quality, low cost,

low price point production. By the turn of the 20<sup>th</sup> century, however, falling production costs, largely due to transportation infrastructure expansion and technological innovation, were allowing the large firms to compete even with the low-cost production of the small firms. The closing of no longer competitive small breweries further exacerbated concentration, both of production volume into a few large breweries and of breweries into a few main cities. Then, even as smaller breweries began opening at the end of the 20<sup>th</sup> century, large breweries continued to concentrate production. There's a contradictory tendency at play: "At one extreme we have the mergers of major brewing concerns to become truly global operators, led by Anheuser-Busch InBev and SAB-Miller. At the other pole there is a multiplicity of small brewing companies springing up, almost daily in some countries, rejoicing in the umbrella terms 'craft' or micro-breweries" (Cabras, Higgins, and Preece 2016, 15).

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**Part II**  
*The Senses and  
Circulation of Beer  
in Amsterdam*

# 3

## Craft(ing) Beer Quality: Sensations, Calculations, and Uncertainties at a Dutch Malthouse and Brewery

### Abstract

The emergence of craft beers and breweries over the past four decades has rapidly and significantly restructured the international beer industry. ‘Quality’ is a guiding principle for many craft brewers and a number of agri-food studies scholars have described the proliferation of craft, artisanal, and slow food movements as a ‘turn towards quality.’ Through research at a malthouse and brewery in the Netherlands, this article examines ‘quality’ in practice. It shows how quality is evaluated and communicated in everyday activities, highlighting the tensions between calculative and sensory ways of qualifying materials. Drawing on science and technology studies, including praxiography and Latour’s discussion of modernity, I suggest that neither calculations nor sensations offer more objective evaluations and that different enactments of quality are instead about navigating overlapping uncertainties. Crafting quality is an ongoing concern throughout the beer supply chain and the unpredictable webs of humans and nonhumans that compose it.



# Introduction

At the annual Craft Brewers Conference, brewers hear the preaching to the choir: quality, quality, quality. (Stange 2015)

The emergence of craft breweries and beer over the past four decades has rapidly and significantly restructured the beer industry (Garavaglia and Swinnen 2018). Many craft breweries position themselves against ‘quantity-orientated’ industrial mass production of pilsner beer, instead engaging in ‘quality-orientated’ small-scale production of various styles. Craft brewing, especially fashioned as the ‘Craft Beer Revolution,’ was constructed (not only by brewers, but journalists, scholars, drinkers, and others) through a binary opposition of the artisanal-authentic-traditional-quality to the industrial-inauthentic-modern-quantity that echoes the rhetorical stance of William Morris and the 19th century Arts & Crafts Movement (Rice 2015, 2016). In the beer industry today, understandings and representations of ‘craft’ and ‘quality’ continue to inform and mutually implicate each other. At the same time, both terms are ambiguous and the difficulties of delineating such categories as ‘craft beer’ or ‘beer quality’ are widely debated (Bamforth 2009). As the use of the descriptor ‘craft’ has grown more widespread, it has become increasingly contested and contentious (Waehning et al. 2018). Craft brewers are not the first to struggle over these concepts, questions about the nature of craft (or *techne*) and quality (or properties) have long preoccupied philosophers, amongst others (Mumford 1934, Ihde 1979, Reeves and Bednar 1994, Scharff and Dusek 2014, Wilkinson-Weber and DeNicola 2016, Dahler-Larsen 2019). Craft brewing does, however, provide an interesting case for studying ‘quality’ in practice, the crafting of qualities that matter.

This article examines how ‘quality’ is produced and known in everyday activities at a malthouse and brewery in the Netherlands. I show how the qualities of materials (malts and beer) are not inherent to them but enacted in qualifying practices. This can involve all manner of ‘things’: like malts, sampling containers, training from a workshop the previous week, fingers, unexpected nitrogen in the barley farm soil, measuring instruments, and expectations of consumer demand. In this way, this article contributes to an interdisciplinary body of scholarship that argues the qualities of food and drink emerge in sociomaterial practices (Busch and Tanaka 1996, Mansfield 2003, Tanaka and Busch 2003, Harvey et al. 2004, Heath and Meneley 2007, 2010, Atkins 2010, Heuts and Mol 2013, Holland et al. 2016, Castro and Torres-Albero 2018, Kanamaru 2020). The purpose of this paper is to explore the relations between two modes of qualifying: calculative and

sensory. Drawing on Latour's discussion of (a)modernity, I show how calculations and sensations can do different things, enact different qualities, but that neither is inherently more objective than the other. At the brewery and malthouse quality is less about (dichotomous) objectivity/subjectivity than (overlapping) un/certainties.

Amsterdam, a city once largely associated with Heineken beer, has more recently become home to a number of smaller, independent breweries. Scholars across disciplines are addressing the 'Global Craft Beer Revolution' (Wilson and Gourvish 1998, Patterson and Hoalst-Pullen 2014, Chapman et al. 2017, Kline et al. 2017, Garavaglia and Swinnen 2018, Slocum et al. 2018), and Dijk et al. (2018) describe the Dutch beer industry's transformation 'from pilsner desert to craft beer oasis' (see also Kroezen and Heugens 2019). For most of the 20th century, the Dutch brewing industry increasingly consolidated as larger breweries bought or otherwise put out of businesses smaller ones. In 1980 there were only 13 breweries in the country, mostly producing similar pilsner beers. Over the following two decades, however, new breweries began to open and make a variety of beers, supported by a growing number of drinkers interested in alternatives to mass produced pilsner. By the mid-2000s, the number of breweries and beer varieties was expanding exponentially. Today there are more than 700 breweries in the Netherlands, with Amsterdam as the 'capital' of the country's craft beer scene (Dijk et al. 2018, p. 277). In accordance with research on the growth of craft beer in other countries (Garavaglia and Swinnen 2018), Dijk et al. (2018) concluded that although no single factor can explain the restructuring of the Dutch beer industry, of particular importance were changes in demand, driven by growing resistance to mass production and wider societal shifts in consumer food preferences. In the agri-food studies literature, this increasing consumer interest in sustainable, local, and organic food along with growing distrust of industrial production, rising concerns over health and safety, and dissatisfaction with homogenous markets of standardized products is described as the 'quality turn' (Goodman 2003, Parga-Dans and Alonso González 2017, Raftery 2017).

As with other craft industries, 'alternative food networks', and 'slow' movements of all kinds (Morris and Young 2000, Murdoch et al. 2000, Pietrykowski 2004, Campbell 2005, Feagan 2007, Pratt 2007, Zukin 2008, Sims 2009, Starr 2010, Goodman et al. 2012, Paxson 2013, Cavanaugh and Shankar 2014, Chaudhury and Albinsson 2015, Ocejó 2017): discourses of 'quality,' 'authenticity,' and 'locality' are common to craft beer economies (Flack 1997, O'Neill et al. 2014, Rice 2015, Gatrell et al. 2018, Howard 2018, Baker 2019, Hubbard 2019, Koontz and Chapman 2019, Thurnell-Read 2019, Williams et al. 2019). Researchers have paid great attention to the co-production of craft beer,

place, and branding as well as brewer and consumer identity formation (Schnell and Reese 2003, Manning and Uplisashvili 2007, Thurnell-Read 2014, Fletchall 2016, Jordan 2016, Murray and Overton 2016, Reid and Gatrell 2017, Darwin 2018, Nilsson et al. 2018, Nilsson and Reid 2019, Wallace 2019). However, the everyday practices of beer economies, and their materialities, have been left mostly unexamined (although see Thurnell-Read 2018). This includes a lack of critical attention to the sensuous qualities of beer, despite their importance to craft beer consumers (although see Dighe 2016, Gómez-Corona et al. 2016, Thurnell-Read 2018). Yet much of the academic discussion about craft beer takes for granted taste, color, aroma, and mouthfeel, as well as the labor that materially produces and evaluates these sensuous qualities.

How do brewers know the malts they buy will be good for producing the desired sensuous qualities in their beer? How do they know that their beer has a good taste, smell, and mouthfeel? In other words, how do brewers ensure the good quality of their beer? Scholars in science and technology studies have paid particular attention to ‘ways of knowing’ (Latour 1987, Harding 1991, Pickstone 2000, Law and Mol 2002, Mol 2002). They argue that knowing is embedded in situated practices that do not so much describe realities as enact them. ‘The implication is that measurement [or any evaluative practice] of quality plays an important role. It helps constitute both the ontology, epistemology, and politics of quality’ (Dahler-Larsen 2019, p. 29). Different enactments of quality, in other words, can do different things, they facilitate certain possibilities and impede others. In their work on valuing tomatoes, Heuts and Mol’s (2013, p. 129) informants related how they know a ‘good tomato’ to what they might do to make a tomato better. Pickstone (2000, p. 13) also considers knowing and doing as interrelated, suggesting that ‘ways of making knowledge’ can also be ‘ways of making commodities.’

Following the methodological section, I turn to Latour’s (1993) work on modernity to frame my discussion of calculative and sensory practices within the rise of ‘Modern’ brewing and the replacement of sense-based practices by instrument-based practices. The majority of the article is then dedicated to ethnographic accounts of qualifying in the malthouse and brewery.

## Methods and Sites

As part of a larger project on the urban political ecology of beer, I conducted ethnographic and historical research about the beer economy and brewing practices in the Netherlands, largely in Amsterdam, between April 2017 and May 2018. This involved semi-structured interviews, walk-throughs, and some

participant-observation at four craft breweries of various sizes, two wholesale beer distributors, one raw material distributor, a specialty malthouse, and a sensory evaluation training; as well as the collection and analysis of historical, media, industry, instructional, and internal company documents. The recorded and transcribed interviews, my fieldnotes, and the collected documents were coded. Quality emerged as a common theme, even before it became an explicit focus on my research, emphasized by my interlocutors themselves and ubiquitously discussed in brewing magazines and handbooks.

This article draws on a selection of that research focused on understandings of quality and practices of qualification at a brewery, malthouse, and in historical and contemporary treatises, standard practice manuals, and handbooks for maltsters and brewers. At the brewery I conducted two hour-long interviews with the brewmaster, detailed walk-throughs of the production process with another brewer, and I participated in a sensory evaluation panel. At the malthouse, I conducted two hour-long interviews with the director of sales, one interview with the maltmaster, a detailed walk-through of the production process (including the nearby barley farms and their in-house laboratory) and was given a collection of company documents (including advertising, brochures for buyers, internal product analyses, and quality control protocols). The interviews followed a semi-structured guide covering their professional history, background about the company, the details of their production process and supply chains, and descriptions of their everyday activities. The importance of quality and of their definition of quality often came up throughout the interview sections. During discussions of everyday activities and the walk-throughs of production, I sought to move beyond their definition of quality to get at the practices of qualification. Following Mol and Heuts (2013, p. 128), I ‘invited informants to talk as if they were... their own praxiographers. Here the art is to persistently ask questions about the specificities of activities that informants tend to take for granted.’ Praxiography was developed in science and technology studies to examine the production of knowledge through the local material practices, different kinds of actors, and human-nonhuman encounters that enact multiple, situated versions of unstable knowledge-objects (Latour 1987, Mol 2002). To do praxiography, Mol (2002, 33) explains, is to ‘stubbornly take notice of the techniques that make things visible, audible, tangible, knowable. [The praxiographer] may talk about bodies – but she never forgets about microscopes.’ I also examined quality practices through a review of the technical, vocational, and industry literature for brewers and maltsters. As Mol (2002, 158) notes, an ‘interesting resource for praxiography is found in the material and methods sections of scientific articles. In theory these specify as much as possible about the practices of investigation.

They instantiate the recognition that the practices forcing an object to speak are crucial to what may be said about it.’ I found historical treatises, standard practice manuals (from the American Society of Brewing Chemists and European Brewers Council), and handbooks (Hough et al. 1982, Briggs 1998, Bamforth 2002, 2009, 2016, Briggs et al. 2004, Mosher and Trantham 2017, Stewart et al. 2018) especially interesting. They helpfully provided further detail about things in the field, connected practices to theory and history, and revealed many ways that qualifying practices exacerbate or collapse non/distinctions between industrial and craft production.

This article presents empirical material from two sites: one brewery, which I call Brouwerij Centrum (BC), and one malthouse, which I call Mouterij Noordzee (MZ). Throughout my research I encountered a great deal of diversity in how quality is evaluated and understood. Although tensions between instruments and sensation emerged as a theme across most research sites, the specific practices and relations involved varied and the way that quality is done at the brewery and malthouse in this article should not be taken as representative. They were not, however, randomly chosen. Both are large enough operations to be significant participants in the Amsterdam craft beer economy and at both a concern for quality was particularly prominent. As noted above, the definition of craft beer, and ‘craft’ more generally, is notoriously problematic (Adamson 2013, Waehning et al. 2018). CRAFT (2020), the trade association of independent Dutch brewers, defines a craft brewery based on: independence (less than 25% of shares owned by a producer of alcoholic beverages that is non-independent), authenticity (brews undiluted beer that doesn’t rely on corn, rice, or other ingredients to reduce costs), transparency (open about ingredients, origin, and production location), and production volume (less than one million hectoliters). Brouwerij Centrum fits these criteria and considers itself a craft brewery. There is no craft malthouse trade association in the Netherlands, but Mouterij Noordzee considers itself a craft or specialty malt producer and it supplies a number of Amsterdam craft breweries, including Brouwerij Centrum.

Brouwerij Centrum is a brewery with an attached pub in Amsterdam. The majority of what the brewery produces is sold and consumed in the brewpub, but their beers can also be found at cafes, bottle shops, and supermarkets around Amsterdam and the Netherlands. They brew more than 10 types of beer, some of which are set and constant while others are seasonal or special editions. The daily operations of the brewery are run by five brewers, including the head brewer, along with another five part-time employees that do the bottle filling. There’s also a small sales and administration staff. The brewpub, which also serves food, has its own managers and employs around 100 workers.

Mouterij Noordzee has been in operation for nearly a century, but only recently began producing specialty malts. Previously they produced pilsner malt for industrial brewing of pilsner beer in the Netherlands but now they produce more than 50 types of malt which are sold to hundreds of customers around the world. The malt master oversees production, involving about 20 workers, including laboratory and equipment technicians. The company employs another 10 people in sales and purchasing.

## Modern Brewing, Beer, and Quality

It is no exaggeration to say that none of the industries have been applied more scientific thought, more inventive and mechanical genius, or a more liberal expenditure of capital, than to what has become known as the art and science of brewing. When it is remembered that this prodigious amount of research and vast outlay of capital has also occurred, to a large extent, within the past century, and that the virtual transformation of ancient into modern methods and processes of brewing has been witnessed by many of our older fellow-citizens, the progress of the industry is all the more remarkable. (*One Hundred Years of Brewing* 1903, p. v)

*One Hundred Years of Brewing* was published by industry magazine *The Western Brewer* as ‘a complete history of the progress made in the art, science and industry of brewing in the world, particularly during the nineteenth century’ (1903, back cover). An explicitly modernist document, the book provides a starting point for considering ‘modern brewing’:

the thermometer and the saccharometer (instruments giving correct indications of temperature and specific gravity) ... may fitly be said to have inaugurated the recent era of rational brewing... As a matter of fact the art of brewing, according to our modern views, would be an impossibility without the intelligent use of the thermometer and the saccharometer in all stages of the brewing process, and therefore we may justly date the modern development of brewing from the time of the general introduction and employment of these instruments in the art. (1903, p. 46)

In this Western [Brewer] account, the use of measuring instruments (that give ‘correct indications’) heralds the modernization of brewing: an irreversible and ongoing transformation of traditional into rational methods and processes, underpinned by scientific and technological progress and the substantial

expenditure of capital. Similarly, historian Richard Unger (2005, p. 47) suggests that: 'The scientific basis for Dutch brewing after the 1870s separated it from its predecessor... [through] a series of changes in the understanding of brewing and how people were to practice the trade after the nineteenth century.' British brewing chemist Horace Brown, who established the Guinness brewery laboratory, described the late 19th century transformation: 'In 1866, brewing operations were conducted on purely empirical lines, the real nature of the processes involved being unknown. The rational scientific control of these operations which is possible to-day is the outcome of a vast amount of experimental study of brewing problems' (1916, p. 390). The brewer was transformed as well: with the 'rise of modern brewing' came the 'scientific brewer' (Glamann 1984) accompanied by a distinction between 'genuine philosophical knowledge of what lay behind sensory appearances and the superficial, sense-based knowledge' (Shapin 2009, p. 26). Not only brewers, but maltsters, hop and barley farmers 'all in some measure experienced the impact of scientific progress' (Sigsworth 1965, p. 550).

Modernity, according to Bruno Latour (1993), is a project of 'purification,' of ontologically separating the social from the natural, human from nonhuman. For the Moderns, Society, comprised of human-subjects, meanings, and values, is the domain of Politics while Nature, comprised of nonhuman-objects, materials, and facts, is the domain of Science. As Latour explains, the first Enlightenment thinkers, wielding knowledge of the Laws of Nature, purified old, illegitimate mixtures of 'social needs and natural reality, meanings and mechanisms, signs and things' into, on the one side, natural mechanisms and material causality and, on the other side, human passions, interests, ignorance, and fantasy. 'The natural sciences at last defined what Nature was' (Latour 1993, p. 35). In the 19th century, the young social sciences took up the Modern critique to purify the natural sciences of Ideology, leaving the 'truly scientific component.'

It was during the 19th century, Daston and Galison (2010) argue, that 'mechanical objectivity' emerged, in which scientists strove to suppress any aesthetic or subjective interventions in their visual representations of nature, increasingly using instruments and machines. The black and white photograph became the 'metaphor for objective truth' not because it was truer than color illustration but because the camera 'apparently eliminated human agency' (Daston and Galison 2010, p. 187). The thermometer was increasingly adopted by Dutch brewers over the same period. It did not appear in a 1798 description of brewing, but its use was strongly recommended in *De Bierbrouwer* (a weekly magazine) in the late 1800s (Schippers 1992, p. 186). Notably, the magazine did not tout the thermometer's superior objectivity but question the brewer's subjectivity. 'In the making of images, the taking of measurements, the tracing



of curves, and many other scientific practices of the latter half of the nineteenth century, self-elimination became an imperative' (Daston and Galison 2010, p. 196). The brewer became considered an agent of uncertainty unless they became a scientific brewer.

As the case of the saccharometer shows, the certainty of instruments was not a given and their adoption was not necessarily a function of their superiority. A saccharometer is a specialized hydrometer, an instrument to measure the gravity (the dissolved solids) of a solution, that allows brewers to calculate, amongst other things, the alcohol content of their beers. Dutch brewers gradually picked up the device over the 1800s (Sumner 2013), but it's widespread use has much to do with tax reforms implemented by the Dutch state in the 1900s (Unger 2005). What was a categorical distinction (low, medium, or high strength) made in various ways, such as the judgement of official tasters (Unger 2001, p. 173), became a 'modern' quantum (Sumner 2013, p. 257). Through the use of the saccharometer the strength of a beer, knowledge of its capacity to inebriate, could be (and eventually was required to be) enacted differently. As with the thermometer, sense-based knowledge was diminished in favor of measurements by instruments as the 'testimony of nonhumans' (Latour 1993, p. 23) was increasingly considered more reliable than that of humans. However, that reliability still had to be enabled, assured, and stabilized through new human experts. 'The introduction of the thermometer and then the saccharometer meant that brewers relied on scholars to describe the use of new instruments in the production process and on instrument makers to give them specialized and accurate tools' (Unger 2001, p. 380).

Rationalization and calculation are process commonly associated with modernity (Harvey 1990). In their most depressing formulation, they comprise the 'disenchantment' of the modern world. For Weber (1991, p. 139), disenchantment meant 'the knowledge or belief... that there are no mysterious incalculable forces that come into play, but rather that one can, in principle, master all things by calculation.' Latour (1988, p. 209) rejects the narrative of disenchantment:

Fortunately, the world is no more disenchanted than it used to be, machines are no more polished, reasoning is no tighter, and exchanges are no better organized. How can we speak of a 'modern world' when its efficacy depends upon idols: money, law, reason, nature, machines, organization, or linguistic structures?

For Latour, 'purification' is only half the story, it is made possible by and makes possible the set of practices he calls 'translation', 'mediation', or 'hybridization'. Translation 'creates mixtures between entirely new types of beings, hybrids of

nature and culture' (1993, p. 10). The modern project of purification is in fact developed through 'the proliferation of hybrids' but these two kinds of practices are usually considered separately. 'Modern,' then, doesn't describe a historical period, but:

a way of interpreting a set of situations by attempting to extract from them the distinction between facts and values, states of the world and representations, rationality and irrationality, Science and society, primary [objective] qualities and secondary [subjective] qualities, in such a way as to trace a radical difference between the past and the future that makes it possible to externalize definitively whatever has not been taken into account. (Latour 2004, p. 244)

In the following two sections, through ethnographic accounts of qualifying malts and beer, I trace how 'quality' is variously enacted in sociomaterial practices, mixtures of humans and nonhumans. In paying attention to how calculations and sensations are done, no radical difference between them emerges, neither is more rational or objective than the other. Latour might say that quality has never been modern, that it is 'simultaneously real, like nature, narrated, like discourse, and collective, like society' (1993, p. 6). The question becomes not whether calculation or sensation is a more accurate way of knowing quality but instead: which versions of quality are produced and evaluated by different practices and what different enactments of quality can do.

## Qualifying Malts

Purchasing raw materials is about finding suppliers that can provide products with the required qualities, in the required amounts, and at the required intervals. The exchange of raw materials requires brewers to know and communicate what they need and suppliers to know and communicate what they have. Exchange both relies on and produces qualifications. Breweries and raw material suppliers (producers and/or distributors) largely shape their relations through specifications. Brewer-supplier contracts establish, often extensive, specifications required by the brewer while suppliers include specification (spec) sheets with the products they deliver and those they sell on the open market (see examples Lewis and Bamforth 2006, p. 87, Stewart et al. 2018, p. 614).

Brouwerij Centrum (BC) purchases most of their malts from Mouterij Noordzee (MN), which supplies a few other Amsterdam breweries as well. BC orders malts regularly, every week or so, as the brewery has limited storage space while the malthouse has an attached warehouse. While BC has a long-

term relationship with MN, they don't have a contract with custom specifications and instead order from MN's selection. MN's catalogue is online, where the BC brewers can find a 'spec sheet' with a 'typical analysis' for each malt in case they want something new. When the malts arrive, the white woven polypropylene bags come with another spec sheet giving an analysis of that particular batch. Yet, there are particular limitations to what can be specified and what a spec sheet can tell a brewer. This section explores malt specifications and their excess. As one brewer put it:

Well malting is a pretty precise procedure. They can guarantee that their malts are within a certain range. You get sheets with specifics from their labs, like what's in the malts, how much protein is in there, how much starch in there, stuff like that. So, you can see from that a little bit what you have but in the end you're just gonna use it and you notice right away if its crap malts. You just try them out and if you're lucky you have a good one right away and if you're a little less lucky you have to try a couple.

Important as the analysis parameters are, the brewers at BC depend as much, or more, on qualifying through seeing, touching, tasting, and smelling both the malts directly and the wort brewed with them. Measuring specifications and sensorially engaging with malts both attempt to deal with the inherent uncertainties of knowing malt quality.

## **Unpredictable Ecologies and Malt Specifications**

'Malting is a specification business,' Ewald, who directs MN's sales team, mentioned multiple times. The goal of the malthouse is to produce the most consistent product possible, and thereby reliable ingredients for brewers. Specifying parameters that can be analyzed with standardized methods is how malthouses qualify the consistency of their products. Specifications are never really about a product itself, but links and relations across supply chains and the 'guarantee that the stream at all stages is fit for use' (Bamforth 2009, p. 258). The malt specifications that a brewer demands, for instance, relate to the specifications that the brewer has set for their finished beer. Malt specifications, then, do two things: they guide production at the malthouse (including the setting of specifications for barley) and they communicate malt qualities and quality to brewers.

While the malting process itself can be intimately controlled, the barley harvest cannot. All manner of barley variations are obstacles in producing consistent malt (Briggs 1998). Not only are there many varieties of barley, but

competition between breeders and farmers leads to rapid succession of new or transformed varieties, while others disappear (Stewart et al. 2018, p. 618). This means maltheuses need to be constantly evaluating these new varieties and adjusting their processes accordingly. Still, the same barley variety often grows and performs differently in different places and in different seasons. Even within in a single batch of barley there can be significant grain variation: ‘in size, in shape, in chemical composition, in germinability, in moisture content and in microbial “load”, as well as in degrees of physical damage’ (Briggs 1998, p. 79). This makes sampling for analysis particularly important and has led to rigidly standardized methods.

In purchasing barley, Ewald is constantly navigating unpredictable ecologies and shifting economic geographies:

So, it’s all determined by weather, price, local conditions, where is the harvest, where is the overage, where is the shortage, what are the currencies doing, and what is the weather doing. So currently, there’s a big drought in Scandinavia and it hasn’t been raining in France for weeks. The harvest is almost done and then we’ll know where we are. So, France this year will export much less than the previous years. So, then you can choose to buy, for example, a little bit more from the UK depending on the rents. This is how the industry works. It’s all about geographics, whether it is sustainable or not. So, we buy mostly from the UK, from France, and we can buy from Scandinavia. But when the shit hits the fan you can always get it from elsewhere.

Part of maltheuse production is the transformation of barley variability into malt that meets predetermined specifications. The malt master at MN is responsible for translating between specifications and production. He looks at the required specifications of the final malt and the analyzed specifications of the barley to decide the exact details of production. If the produced malt is outside of specification, the malt master has to interpret this deviance into production process adjustments. As Mansfield (2003, p. 13) writes of quality and agri-food commodity chains:

As material products move through commodity chains, specific pieces of the biophysical world, and specific biophysical processes, are understood in certain ways, and are linked to cultural and economic practices, which are themselves not possible without their linkages to physical processes... Yet at the same time, which characteristics count as quality – or not – is defined within the commodity chains and their power-charged relations.

## Spec Sheets and Circulating Malt Parameters

Only a few years ago MN was owned by an industrial brewery, producing base pilsner malts for their owner-client. Since becoming independent and beginning their transition into specialty malting for craft brewing, their business has changed dramatically. Now, three years later, they produce around 50 kinds of malts for some 400 customers distributed across nearly 60 countries around the world. Ewald:

So how do we manage? We manage because we sell our goods via partners and a large maltster does it directly to breweries. Why are these partners willing to sell our product? Because we give them a portfolio [a collection of spec sheets] with a range of products and they are able to sell it to all these breweries. So, we sell one container, 20 tons, and they sell to 50 customers and they're on the road every day. They do the same for hops. They do all the products you need to brew beer, and probably kegs. By having new products, they stay relevant and once your product is part of the recipe for a brewer, a brewer is very difficult to change. So, if he uses the MN pilsner malt for his beer and his beer is doing well, he will never or very unlikely to change that recipe very soon. So that's why we're relevant. Also, you build a brand with a good reputation, reputation for good quality.

MN doesn't have direct relations with most of the breweries using their malts. They connect to potential client-breweries through spec sheets that their partner-distributors circulate (along with MN's story and ethos). They've built their reputation for good quality, in part, by consistently delivering malts within promised specifications; by delivering a degree of certainty.

The materiality of the spec sheet is significant (see Beer 2016, p. 111): it can circulate as a piece of paper or as a pdf; its standardized syntax enables certain communicative possibilities. Those communicative possibilities rely on what O'Connell (1993, p. 130) calls 'material collectives – communities of persons and institutions mutually exchanging the same representations and material representatives for abstract scientific entities.' The material collective includes laboratory instrument producers, calibration services, and the European Brewers Convention (which publishes standard methods) as much as malthouses and breweries.

Spec sheets work as performative interfaces: certain parameters and analyses become 'specs' and not others, implicitly valorizing the qualities evaluated. As the objects of evaluation, qualities are rendered significant and as the products of evaluation they are rendered adjustable and improvable in particular ways.

Each parameter lists the unit of measurement and the minimum and/or maximum values. These analyses are not just performed on the final product, the need to achieve specification impacts the entire production process. The specs are meant to provide brewers with a degree of certainty about the quality of malts they buy, yet I rarely heard brewers talk about analyses other than moisture, extract, and proteins and specification parameters were rarely how brewers answered my questions about how they know malt quality.

## **Making Malt Sense-able**

While Lucas, a brewer at BC, was first showing me around the brewery I asked how he knows whether a batch of malts is good or not. Lucas opened a 25kg bag of malt so that I could see, touch, smell, and taste. Even ‘looking’ at malts isn’t just about ‘seeing’ them, we touched and shifted them around, paying attention to how uniform their color was throughout the bag, picked up handfuls and examined individual kernels. Smelling and tasting malts for their ‘goodness’ has to be learned, it requires active engagement. Lucas doesn’t just smell or taste in general, he smells and tastes with purpose: ‘See with this one it’s about the caramel flavor. How strong is it? Do I need to adjust my ratios?’ Brewer and author John Mallett (2014, p. 9) talks about the particular importance of chewing:

Chewing malt is a vital part of beer formulation; it is the best way to explore and analyze the combination of subtle differences between different varieties. It’s amazing how many people are disconnected from their senses of taste and aroma, even those within the industry... Munching on malt lets a person assess more than just flavor, giving a brewer a direct example of crucial quality metrics such as differences in friability and moisture content.

All of this speaks to something fundamental to both instrumental and sensory qualifying: to evaluate qualities is at the same time to make them evaluate-able; they are not just there waiting to be described by a qualifier who already knows how to describe them. Making qualities evaluate-able involves the past work of sensory and instrument training as well as the experiential accumulation of tacit knowledge (often invisible at the time of evaluation) and the immediate work of chewing, sampling, extracting, etc.

But which qualities, and their constitutive qualifying practices, matter? In a 1914 article for the *Journal of the Institute of Brewing*, Harold and Heron, reflecting on the purchase of malt, wrote: ‘we feel sure that the majority of brewers fail to fully appreciate the limitations of malt analysis’ (1914, p. 466). Recent studies continue to question the limitations of laboratory mash analysis.

It is widely recognized that malts with the same specifications can substantially vary in brewery performance (Mallett 2014; Bamforth 2016). There is, in other words, a great deal of uncertainty that comes with the situated certainties of specifications, standard parameters, and analysis. Brewers also remain aware of variable harvests and ecologies, the uncertainties of which can never be totally resolved through the calculation of specifications:

You need to check for things like dust, which will drop your yields but, in the end, you're just gonna have to use them and see. Yeah, all the time and every harvest is a little bit different. So, we've had hops we used for 4 years and then the 5th year it was bad and so we don't use it again maybe next year. Everything changes. We do have recurring beers and the recipes are like 90% set, but we tinker around with them all the time. Every batch is a little bit different. We try to make it better every time. That includes the hops, sometimes you just completely change the hop or the amounts in the beer. The same for the malts. There's just one reference: you taste them. You brew a beer with them, sometimes small scale just to test them out. You know pretty much right away if it's a good or bad. If you don't like a batch or a kind you just stop using it and pick another one.

As Daan describes, malts can be made differently sense-able by making small batches of wort with a sample of the malts. Similarly, Mallett (2014, p. 188) recommends: 'If you want consistent malt, buy from a reputable maltster and specify variety. Don't get hung up on COAs [spec sheet]. If you ask me about the quality of a given shipment of malt, I'll tell you to brew three batches and you'll know.'

Making evaluate-able, measure-able, sense-able, describe-able; this is the work required of any qualifying practice. This is work that implodes past – the dead labor concretized in instruments, the established networks of material collectives that stabilize metrics and methods, the training and experience embodied in qualifiers – and future – what the malts will be turned into, what other materials they will be mixed with, what consumers will desire.

## Qualifying Fermentation

The first major phase of beer production is brewing wort: boiling together water, malts, and hops. The second major phase of beer production is fermentation, yeast's metabolic process that transforms sugars into cellular energy, along the way producing ethanol and carbon dioxide. In addition to alcohol, fermentation



produces the vital flavor compounds that give a beer its characteristic flavor. Talking with the brewers at Brouwerij Centrum, fermentation is a kind of collaboration between brewers and yeast. Although, here's how a Brewers' Association handbook describes yeast-brewer relations: 'The saying, "Brewers make wort, yeast make beer," is true, but as brewers, we have a lot of control over how yeast make our beer... A large part of what makes a great brewer is understanding and manipulating fermentation for the ideal result' (White and Zainasheff 2010, p. 65). For brewers, consistency and control of the fermentation process are foundational for producing the desired qualities in a beer. In the brewery, monitoring instruments are also part of the fermentation process. Monitoring is about making certain that fermentation is proceeding as planned, mediating uncertainty about the desired qualities of the final beer, which are bound with realizing its economic value. As with the malthouse laboratory: 'A brewery would not succeed if its measurements were made on finished beer alone' (Bamforth 2003, p. 172).

At BC, everyday one brewer checks the beers-in-process and one day Daan, the head brewer, took me along. We visited and sampled each fermentation tank, tall tubes with conical bottoms containing something that both was and was not beer. BC's tanks have automatic temperature control systems, but Daan still looked at the readings to make sure; temperature control is too important to entrust entirely to automation. To draw a sample, Daan sanitized the built-in sampling valve, opened and flushed it for a few seconds, filled a 100ml tube, capped it, closed the valve, and sanitized it again. (He didn't mention them, but the European Brewers Convention provides standard sampling methods, and if something goes wrong sampling methods are often where quality control investigations begin). Daan had previously explained that daily monitoring of fermentation involves at least five interactions with each sample:

Well you can know a few things. You can measure your pH and you can measure your sugar content. You can even measure things like turbidity. These are all things you can measure with real devices and they tell you a story about how happy your yeast was and how fast your fermentation went. You can even see some infections in your beer from just these variables. But in the end, it's all got to be sensorial. You have to taste, you have to see, you have to smell.

In the previous section, qualifications had much to do with the uncertainties of exchange and relations across divides, with sellers framing products and buyers assessing them. Within BC's production process, qualifying beer-in-process has more to do with monitoring, adjusting, and assuring quality. In the everyday

monitoring of fermentation at BC, the brewers measure and calculate with instruments, ‘real devices,’ that isolate parameters. The resulting measurements and calculations of isolated parameters are made meaningful and useful in how they are recorded, especially into an integrative spreadsheet. Brewers also see, smell, and taste the fermenting beer. If something is off, they have to isolate the sensation to describe the problem.

## **Narrating Measuring Instruments**

How do ‘real devices’ and measurements tell stories about ‘how happy the yeast is and how fast the fermentation is going’? After taking a sample, Daan and I walk over to a metal work table that has some equipment on it, including a handheld electronic pH meter. Putting the container on the table, Daan picks up the probe-like pH meter, removes the cap from one end, and gives it to me to hold. It has some liquid in it, a storage solution that protects the sensitive electrode. He turns the meter on, dips it into the sample, the number on the display changes, and...4.23. The electrode measures hydrogen ion activity to denote the acidity or alkalinity of a solution as a pH – 4.23 is acidic. Daan approves and types it into his phone. To put the meter away, the beer-in-process needs to be thoroughly rinsed off, the electrode gently wiped down, and some more pH 7 buffer solution added to the cap. (Maintenance and cleaning practices, like sampling and calibration, are part of measuring and calculating.)

A single measurement alone doesn’t tell a story, at least not a story dramatic enough to say much about the happiness of yeast. The second step is that the measurements over time are collected and ordered spatially. Daan records the measurements in his phone while we’re on the brewery floor but later he’ll go to the office and enter them into a spreadsheet. ‘No more paper and pen kind of shit,’ Daan says, ‘cause that will make you crazy.’ Instead, the spreadsheet’s standardized structure arranges the measurements into a kind of narrative – in the sense of ‘an account of a series of events, facts, etc., given in order and with the establishing of connections between them’ (Oxford English Dictionary 2020, narrative entry). Even with two entries – fermentation day 1: pH 5.21 and day 2: pH 4.32 – the measurements can tell a story. In this case, Daan thinks it’s about happy yeast since the fermentation tank pH should drop sharply in the first 24 hours if the yeast is happily metabolizing. Still, it’s just a story and only based on two plot points at that. If the pH continues dropping into the following day then instead of happy yeast, there may be a microbial infection... plot twist.

## Instrumentalizing Sensations

Daan draws a new sample from a fermentation tank, this time straight into a pint glass pulled from the bar. First, he looks at it, taking note of the color and haziness, then he smells it, and he tastes it. Daan uses his senses, his eyes, nose, and mouth, to qualify the sample from the fermentation tank. What's important to remember here is that the sample both is and isn't beer, it's fermenting wort, its beer-in-process. The purpose of daily at-line sampling isn't to make a holistic judgement ('this is a good beer') but to check for and identify particular problems. Mostly, this involves tasting for off-flavors, undesired flavors that can indicate something has gone wrong in the brewing process. Daan:

So, we have the basic beers that we brew a lot everybody knows how they should taste. If we try a new recipe, it doesn't always have to be my recipe, it's one of the brewers' recipes so he will check it extra, he'll want to know is this how I pictured it from the start? Otherwise, if there are off-flavors in there everybody here is trained to recognize them. We check the beers every day so off-flavors we'll get pretty soon, and we know okay this beer is that. If there are no off-flavors it becomes the taste. The one who checks them will taste and if he thinks something is maybe a little bit off then he'll notify the rest. If we need to, we'll do a group tasting to see if we need to adjust something.

This is what I mean by instrumentalizing the senses, the practice of breaking integrated sensory experience (taste) into component parts (flavors) and isolating indicative sensory inputs. There are two primary requirements for successfully instrumentalizing the senses during the brewery's sampling: training and a group. Or, put in different language: calibration and repetition. The off-flavor diacetyl provides an illustrative example.

Diacetyl is an organic chemical compound that, like ethanol and carbon dioxide, is a byproduct of fermentation, except that yeast ultimately reabsorb and break down diacetyl. It's also one of the compounds that gives butter its flavor and at higher concentrations can give beer a buttery or butterscotch-y taste. If yeast fail to reabsorb diacetyl it can mean the yeast is stressed, or there isn't enough yeast present, something is wrong with the temperature, or a microbial infection. A brewer that can identify diacetyl can taste these problems; a skill that can be learned, but never once and for all. Diacetyl is one of the most common off-flavors and is actually present in most beers at low concentrations, but its ubiquity means you get used to it. Even an experienced brewer, Daan explained, has to regularly train their tasting:

You can buy a little bottle of concentrated off-flavors and just take a drip and put it in a pilsner or a very clean beer that doesn't really have a lot of character. You throw in a few drops and then you know how the off-flavor will taste. You have to do this regularly because you'll forget them. Once you know where you have to look, suddenly you're gonna find them everywhere. A lot of Dutch craft beer is very good, and everybody likes it, but if you're really trained then you can still find little traces of off-flavor there. You really have to train your tasting every few months.

Brewers and sensory analysis trainers talk about 'finding' certain flavors, meaning one has to know where and how to 'look.' By training with the sample off-flavor in isolation (putting it in a beer with few other flavors), the taster learns how to find it in more complex beers. Where is the flavor experienced on the tongue? Does it show up towards the beginning or the end of a sip? Are there aromas that go with it? However, even with training, not everyone is able to 'find' diacetyl:

You can also be blind to certain off-flavors. So, we have one guy here that's blind to diacetyl, he doesn't taste it all... There can be a situation with five guys at the table and he takes a sip and says, 'Oh, I'm pretty happy about this beer!' The four other guys drink it and say, 'What? What is this?' That's why you need a team to taste, you can't do it on your own because everybody has some blind spots. That's also why it's a group effort. If he was a brewer on his own there's a good chance a lot of his beers would be bad without him knowing. You always need some peers to taste your beer with. Same as with bitter. A beer that's very bitter for you might be nothing to me. It also changes so if you're a brewer that does a lot of very hoppy beers and always drink them you start to be blind to it. You start to make beers that really excite you but scare the crap out of everybody else.

In both training and evaluating, the senses are instrumentalized collectively. Daily tasting of the beer-in-process at BC might only be done by one brewer, unless they detect a problem, but different brewers taste each day and record their notes into collective brew sheets, much as daily measurements are integrated in spreadsheets.

## Conclusion

This article has considered how malt and beer quality are enacted in everyday

activities, qualifying practices. In the malthouse and brewery that I studied, quality appears not as a finished result of production, nor merely a function of branding and advertising, but as an ongoing matter of concern. Holland et al. (2016, p. 194) make a similar point in their study of quality practices in Direct Trade coffee:

What emerges here is that quality consists of a variety of activities that take place throughout the value chain... What the case of coffee suggests, is that rather than creating differentiated markets for products that are already made good at earlier stages, quality is done continuously. Doing quality requires different kinds of activities at different material stages of 'coffee', and it is these that require coordination.

In this article I have focused on calculative and sensory ways of evaluating quality, a distinction made in both the field and practical handbooks. Maltster and brewer handbooks are filled with methods for turning 'subjective sensations' into more 'objective data.' In the malthouse and brewery, however, measurements are not necessarily any more satisfactory than sensations at knowing about quality – both are often required. Similarly, in grading olive oil quality, 'the technoscientific correlates of extravirginity (the acidity level in the oil, determined by chemical analysis) are not enough. To be graded as "extravirgin," an olive oil also has to be evaluated organoleptically as well' (Heath and Meneley 2007, p. 599). Instead of measuring instruments or taste buds offering more objective or accurate evaluations of quality, both take work to offer a degree of certainty that is nonetheless always situated, always partial. Quality appears to be less about dichotomous objectivity/subjectivity than the navigation of overlapping un/certainties.

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# 4

## **Tasting Amsterdam's Beerscape: The sensory production of space, value, and data**

### **Abstract**

This article argues that taste is engaged in actively producing, not only consuming, beer and the Amsterdam beerscape. I present three cases in which taste is productive of, in turn, space, value, and data. First, the historical role of taste in catalyzing Amsterdam's craft beer scene, especially through the co-production of new tastes and squatter spaces in the 1980s. Second, the (wage) labor of taste in breweries that produces value and mediates the metabolic circulation of beer. Third, the sharing of taste and production of data by beer a geosocial network app, Untappd, that permeates the mediatized Amsterdam beerscape. In arguing that taste is productive, the question of cultivating 'good taste' as a political-ecological project is unavoidably raised and will be addressed in the conclusion. In showing how taste actively takes part in the production of space, value, and data, an interconnecting but contradictory dynamic emerges: a dialectic of taste equalization and differentiation.

## Introduction: Taste your way across the city

This article explores the active co-production of bodily senses and urban landscapes; in particular, the sense of taste and Amsterdam's beerscape. Consider an online guide to sampling beer in Amsterdam that entices the reader to "Taste your way across the city!"; ultimately advertising a tour that "covers all the best bars and breweries so you can see, and taste, the Netherlands' strong brewing history." The advertisement presents Amsterdam as a sensuously diverse and historically rich beerscape. City, history, and beer intermingle, each as taste-able as the others – a possibility that emerges only by profoundly entangling and conflating tasting, experiencing, knowing, and consuming. Tourists are increasingly encouraged to taste places, cultures, histories, and 'the other' as an 'authentic' way of experiencing and knowing (Trubek 2008; Zukin 2008; Hubbard 2019). Yet tasting appears to be little more than a metaphor-mask for economically consuming. Urban branding taglines offer 'a taste of...', thereby marketing and advertising "place as taste and meccas of consumption at the same time" (Haden 2011, 245). While this has become ever more pronounced in recent years, particularly with the rise of inter-urban competition for global tourism (Young and Markham 2019), the association of taste and consumption has deeper historical roots. As Raymond Williams (1985, 315) pointed out, "the idea of taste cannot now be separated from the idea of the consumer. The two ideas, in their modern form, have developed together." This has not only shaped conceptions of taste – that one can taste a city by purchasing things in it, for instance – but likewise conceptions of consumption as "the desire for consumer goods becomes a kind of hunger" (Wilk 2010, 40). Taste has also been thoroughly abstracted from the senses as a metaphor for aesthetic discernment, as in the notion of 'good taste' (Williams 1985; Bourdieu 1984). Whether as sensation, consumption, or judgement, taste has often been treated as relatively passive, 'as a physiological or a social reflex' (Hennion 2005); a more or less involuntary expression of either Nature or Culture in bodily and/or economic consumption.

I argue that taste is actively engaged in producing urban landscapes as much as consuming them. In turn, sensuous, consumer, and aesthetic tastes are shaped and reshaped by the practices and relations through which, like the city, taste emerges as a historical natureculture (Heynen, Kaika, and Swyngedouw 2006). I present three cases in which taste and tasting produce space, value, and data. First, the historical role of taste in catalyzing Amsterdam's craft beer scene through the co-production of new tastes and squatter spaces in the 1980s. Second, the wage labor of sensory evaluation in breweries that produces value and mediates the metabolic circulation of beer. Third, the sharing of taste and production of data

on a geosocial beer rating app, Untappd, that permeates and mediatizes the beerscape. In showing how taste actively takes part in the production of space, value, and data an interconnecting but contradictory dynamic emerges: a dialectic of taste equalization and differentiation.

My notion of the beerscape is adapted from the interdisciplinary literature on foodscapes as the contentious, relational landscapes or networks of food production, distribution, consumption, and media (Johnston and Baumann 2015; Johnston and Goodman 2015; Goodman 2016; Miewald 2020). In a review of the literature, Miewald (2020, 198) explains that “the foodscape concept both requires and rewards being situated in a particular place and focused on the relationships that a particular community has with food.” I also build on Besky and Brown’s (2015) call to locate and re-center labor in the study of agri-food systems, along with Spackman and Lahne’s (2019, 143) emphasis on the importance of ‘sensory labor’ – in which “perceiving the tastes of foodstuffs both requires work and produces value,” such that “we can and should be talking about the nature of this work... its place in the food system, and the effects of explicitly and implicitly enrolling eating bodies in the co-creation of a food system that may ultimately affect their bodily health.”

Latham and McCormack (2004, 714) once noted that “there is almost a complete absence of any attention by geographers to the role [alcohol and other psychoactive substances] play in shaping particular urbanities and socialities” (although see Kneale 1999; 2001). In the years since, Jayne, Holloway, and Valentine (2006; Jayne, Valentine, and Holloway 2008; 2010; 2011; 2012) have compiled and contributed to growing geographical research on ‘drink, drinking, and drunkenness.’ Yet, as Lawhon (2013) points out, this has mostly considered alcohol as ‘already in place.’ Drawing on urban political ecology (UPE), Lawhon considered the metabolisms and circulations of alcohol as a sociomaterial, elucidating its flows, but especially its frictions, and conditional relationalities focusing on the microscale: “As significant as the macro is the impact of the metabolization of alcohol (and food and water) on individual bodies” (2013, 687). Taste and tasting mediate the bodily metabolization of alcohol (and food and drink) and vice versa. In this article I take up the above authors’ call for research to foreground the materialities of drink, like sweetness, flavor, and texture. At the same time, I background the most common matters of concern in the alcohol literature: the intoxicating chemical ethanol and the phenomenon of drunkenness. Instead, with the sociomaterial flow of beer as my guide, I lay out three historical-geographies of beer taste and tasting that are more concerned with how the senses and the urban, sensation and urbanization, articulate each other. In this way, this article responds to calls for more embodied UPE research



(Doshi 2017; Tzaninis et al. 2020) by paying attention to transcalar entwinements of bodily and socioecological metabolisms.

## **From senses and cities to sensuous urbanization**

There have been a number of sensory urban studies over the past two decades (Adams and Guy 2007; Cowan and Steward 2007; Defazio 2011; Degen 2008; Diaconu et al. 2011; Low and Kalekin-Fishman 2018). Many of these studies consider “the role of the senses in forming and shaping experience of the city... [exploring] issues of regeneration, decay, temporality and mobility within and through the city” (Adams and Guy 2007, 133). This literature spans a variety of approaches but largely argues for the activity of the senses in experiencing the city; in other words, that “sensing is an action in which the body exerts a crucial role actively making sense of the world” (Degen 2008, 40). While the sensory urban literature is too broad to give a fair review in this article, there are certain general trends. The predominant interest is in sensorially experiencing the city (Borer 2013) and though many authors also consider this to shape the city there is relatively little consideration of how this happens outside of everyday consumptive activity. The senses are generally understood to be historical, but this is often addressed more phenomenologically than in terms of how changing relations of production and reproduction (understood broadly) remake bodies, worlds, and their interrelations (Defazio 2011). In this way, the sensuousness of urban environments is often taken more as a given, as already-there, a context to be sensed and made sense of, than itself an ongoing process of sensuous production.

Urban political ecology offers a different understanding of the urban than much of the literature above, one interested less in ‘the city’ as such and more in the process of urbanization (Heynen, Kaika, and Swyngedouw 2006). This Marxian approach is grounded in David Harvey’s (1996, 52) understanding of urbanization “not in terms of some socio-organizational entity called ‘the city’... but as the production of specific and quite heterogeneous spatio-temporal forms embedded within different kinds of social action.” In this way, for UPE scholars, “the [sensuous] environment of the city (both social and physical) is the result of a historical-geographical process of the urbanization of nature” (Heynen, Kaika, and Swyngedouw 2006, 6). This is a process of laboriously metabolizing nature, continuously giving rise to new socio-natural forms and entities, through the production, distribution, and consumption of commodities as use values and the reverse circulation of money as capital (Swyngedouw 2006, 109). Following Marx’s (1961) dialectical understanding and positioning of labor, or practical

activity, at the heart of socioecological metabolisms, this entails the simultaneous, internally related, transformation of environments and bodies.

Alex Loftus has explicitly developed a relational and historical understanding of bodies, senses, and environment, in which “there is a mutual exchange between the material environment of the city and the sensory experience of those living within it” (2012, 41). He also draws on feminist standpoint theories (Haraway 1991; Hartsock 1999) to open up the category of ‘labor’ to more deeply consider situated epistemologies of urban environments. Loftus (2007, 42) writes: “Environments are produced through work and play: the ways in which we think about those environments are grounded in the knowledges developed through our work and play.” He thus argues: “If practical activity is at the heart of the process through which nature is humanized and humans are naturalized, sensuousness is fundamental to this active, practical materialism. In turn, the senses themselves are understood to be shaped relationally and historically” (2012, 35).

## Theorizing taste as practical activity

Taste has, on the one hand, been relegated to the bottom of various hierarchies of the senses by a number of thinkers canonical to the project of Western philosophy and, on the other hand, been perhaps the most visited fount of sensory metaphors (Korsmeyer 1999; Perullo 2016; Agamben 2017). In the social sciences, following the influence of Bourdieu, the study of taste has largely been the domain of the sociology of culture focused on consumers and their objects of passion, “from the most legitimate areas such as painting or music to the most ‘personal’ ones such as clothing, furniture or cookery” (Bourdieu 1984, 13). We might identify two differentiated types of taste: gustatory taste and aesthetic taste. The first refers to bodily sensations, the physiological capacity to experience flavors. The second refers personal and collective preferences and judgements, the psychocultural capacity to discern goodness. In both cases, “given the distinctive malleability of taste, the social context of tasting decisively shapes the taste experience” (Ferguson 2011, 376). Indeed, Bourdieu argues in *Distinction: A Social Critique of the Judgement of Taste* that there is a strong correlation between ‘cultural practices’ and ‘educational capital’. In this way, Bourdieu (1984, 190) argues that taste is ‘a class culture turned into nature’; taste is both embodied and ‘helps to shape the class body’ such that “the body is the most indisputable materialization of class taste.”

More recently, scholars engaged with actor-network theory and material semiotics have critiqued this conception of taste (Teil and Hennion 2004; Hennion 2007; Mann 2015). The work of Antoine Hennion has been particularly influential

(Venrooij 2018). Hennion (2007, 131) writes against the dominance of Bordieuan sociology of taste scholarship, which he claims is overly critical and conceives taste “only as a passive social game, largely ignorant about itself.” Hennion, along with Teil (2019; Teil and Hennion 2004), emphasizes the active education or training of gustatory taste, and the senses more broadly, by considering the figure of the amateur. Taste and tasting, these scholars argue, should be understood as active, embodied yet distributed, reflexive practices (Hennion 2005; Mann et al. 2011; Teil and Hennion 2004). Taste, then, is about “making oneself sensible to things through the things themselves” (Hennion 2007, 102). Building on Hennion, who considers taste “first and foremost a problematical modality of attachment to the world” (2007, 131), for feminist geographer Elspeth Probyn (2016) ‘taste acts as a connector between history, place, things, and people.’ Likewise, the visceral geographies explored by Hayes-Conroy and Hayes-Conroy (2008; 2010; 2013) interconnect the Slow Food movement’s taste education programs and the crafting of new relations to agri-food systems.

Following the authors above, “taste is not an attribute, it is not a property (of a thing or of a person), it is an activity” (Hennion 2007, 101). However, in these authors’ (productive) rejection of Bourdieu, their insistence on the ambiguity and reflexivity of bodies and materials sometimes tends towards an almost ahistorical indeterminacy in danger of rendering body and object as blank slates awaiting training. A return to Marx’s more historical relationality is necessary. For Marx (1961, 108), “the forming of the five senses is a labour of the entire history of the world down to the present” – and labor, as Wark (2015) helpfully reminds, is the intermingling of many things, most of them nonhuman. Despite, at times, his unfortunate under- and over-tones of Man’s autopoiesis, taking Marx’s own relational ontology seriously means the forming of the senses, the becoming sensuous of the world, is necessarily a matter of sympoiesis (Haraway 2016). Writing about vision, Haraway (1991, 190) explains that “all eyes, including our own organic ones, are active perceptual systems, building in translations and specific ways of seeing, that is, ways of life.” This interconnection between ways of sensing and ways of life is central to a historical-geographical materialist understanding of the senses. Haraway (1991, 192) goes on: “Vision is always a question of the power to see – and perhaps of the violence implicit in our visualizing practices.” Indeed, “aesthetic intolerance can be terribly violent” (Bourdieu 1984, 56). Such questions are hardly, if at all, considered by Hennion, though his work remains important for bringing to the fore not only the activity of taste but the more immediate, reflexive, distributed, and more-than-human processes of learning and transforming taste that are fundamental to my argument for its productivity: “Taste, pleasure and effect are not exogenous variables or automatic

attributes of objects. They are the reflexive result of a physical, collective and equipped practice, regulated by methods that are themselves constantly revised” (Hennion 2007, 108). I take up this conception of tasting as an active practice that is not predetermined by one’s social position but can be trained and transformed – thereby becoming a site for not only critique but politics – while putting these practices of training, and the bodies they produce, into relation with their power-laden social and historical contexts.

## Methods

The research for this article was conducted in three parts, corresponding to the three empirical sections below, between April 2017 and December 2018 in Amsterdam. First, I explored the history of Amsterdam’s craft beer revolution through interviews with three key players: the funder of an early craft brewery and two amateur historians, one is also a craft brewery owner and the other works in craft beer distribution. Each is a long-time participant in Amsterdam’s craft beer scene with personal experience going back to the late 1980s and these interviews took the form of oral histories that were recorded and transcribed. Second, I investigated sensory labor in breweries through interviews and participant-observation. I conducted research at four Amsterdam breweries involving two hour-long recorded interviews with the four brewmasters that were transcribed and coded. In between these interviews the brewmasters took me on a walk-through of the production process (from receiving raw materials through bottling) during which I kept notes. While the first interview was wide-ranging, in the second I focused on their sensory evaluation program and at two breweries I sat in on a sensory evaluation panel, keeping notes as they asked me not to record. I also participated in a basic sensory evaluation training program run by a specialist who has worked in craft breweries in the Netherlands and United States. I recorded these three two-hour workshops and transcribed the most relevant sections. I also sat down for a formal recorded interview (focused largely on the similarities and differences between craft and industrial production) and informal beer tasting with the sensory evaluation specialist. Finally, I investigated the geosocial beer rating app Untappd through interviews and autoethnographically over the course of my research. Untappd came up organically during my interviews at breweries, which first spurred my interest in the mediatization of the beerscape and led me to download and begin using it. I then recruited fifteen Untappd users through the built-in messenger and asked them what they used the app for, how they rate beers, and what they think about it. While all of my interlocutors, with the exception of the sensory evaluation specialist, were Dutch, the interviews were

all conducted in English and at no point did any interviewee express this being an issue.

## **Contesting Taste, Producing Space**

Configurations of beers, tastes, and spaces were shifting during what would now be identified as the beginning of Amsterdam's 'craft beer revolution' (see Garavaglia and Swinnen 2018). In the 1980s, there was a relatively intentional effort by various actors to, in their words, 'revitalize Dutch beer culture.' This played out across the Netherlands, for instance with the founding of consumer organization PINT (Vereniging Promotie en Informatie Traditioneel Bier; Association for the Promotion of and Information about Traditional Beer) in 1980 that sought to inform and encourage consumers to drink beers other than industrially mass-produced pilsner (Dijk, Kroezen, and Slob 2018). PINT is one example of how the project of cultivating 'good taste' was central to the early coalescing of a 'craft beer movement' in the Netherlands, and elsewhere. More widely, proponents of alternative food networks of all kinds argue that cultivating 'good taste' is at the center of their political-ecological projects to transform food systems, such as Slow Food's emphasis on 'taste education' (A. Hayes-Conroy and Hayes-Conroy 2008; Pink 2007). The notion of 'good taste' links everyday materialities of food choice (the sensuousness of eating) with normative political ideologies about food: "someone with good taste is able to appreciate, to sense, to taste, the misery tied up with food or drink" produced in certain ways (Mol 2009, 279). Critics, on the other hand, often argue that encouraging 'good taste' is an elitist project that reproduces or exacerbates oppressive relations and existing inequalities (Guthman 2003; 2008). Taking these tensions seriously, I turn to Amsterdam and its specific history in which the early craft beer movement was interconnected with the squatter movement, bringing into sharper relief how shifting tastes, and attempts to produce new tastes, are bound up with the production of space. This was the period after the 1960s countercultural 'Provo' movement in Amsterdam, which influenced Henri Lefebvre and the Situationists (Merrifield 2013, 33), for whom "everyday urban life was a battleground, one that was increasingly important not merely for assessing how capitalist power operates in contemporary urbanized society, but also for resisting and contesting that power through both play and direct action" (Fraser 2014, ebook).

### **Alternative Tastes**

Amsterdam's craft beer scene has origins amongst the city's storied squatters.

Early 1980s Amsterdam was a ‘city in crisis’: the population was in decline and unemployment was high, the streets were dirty and plagued with dilapidated buildings (Owens 2008). In this context, Amsterdam squatters articulated alternative urbanisms centered on affordable housing, concern for quality of life, and neighborhood culture in opposition to large-scale, growth-oriented urban redevelopment (Kadir 2014; Owens 2009; Pruijt 2017; Vasudevan 2017). The proliferation of squats created “a radical infrastructure that also included cafes, bars, infoshops, bookstores, cinemas, bicycle repair shops, clinics and gallery spaces” (Vasudevan 2017, 90). The bars played an important role as social spaces, sources of income, and venues for meetings and events (Pruijt 2017, 262; see also Highmore 2018).<sup>1</sup> Beer was a common drink, however, many squatters had a distaste for the homogenous selection of industrially produced pilsners that dominated the beer market (Dijk, Kroezen, and Slob 2018; Pruijt 2017). As one long-time participant in Amsterdam’s craft beer scene told me:

In the mid-80s a group of people thinking ‘death to the big capitalists’ stopped drinking Heineken, Grolsch, Bavaria, and those beers. Independently from each other, they went on a search for different beers and most of them ended up in Belgium, which, in those days was the only place in Europe you could find something else than standard lagers. They started bringing those beers back to Amsterdam, mainly in the squatting scene, and their friends liked it. So next time they brought back two crates, then more, and that’s how it went. They evolved into larger enterprises that came together at a certain stage when they were sharing a squatted warehouse that had a big bash on a Friday evening and then on Monday morning, they couldn’t tell which part of the stock that had gotten pushed together belonged to who. So, they decided to come together.

After nearly a century of intensifying industry consolidation – reducing the number of independent breweries in the Netherlands from 500 to 13 between 1900 and 1980 (Dijk, Kroezen, and Slob 2018, 267) – the emergence of alternatives to industrially-produced pilsner in Amsterdam was undergirded by social and physical infrastructures produced by squatters. A cooperative was established that began importing styles from Belgium, storing pallets of beer in squatted warehouses; a specialty bottle shop was opened by someone active in the squat scene, and would deliver to squats; and, the city’s first new independent

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<sup>1</sup> The squatters were heterogenous, to say the least, and one fault line amongst factions was drinking. Owens (2009) chronicles some of these tensions, quoting squatters who argued that “political resistance means something more than drinking in a bar and claiming to be autonomous” (201), drawing divisions along such lines: “We want to distance ourselves from the nihilistic inactive drinking fashion squatters” (205).

brewery in decades was founded by someone who began illegally homebrewing in a squatted room.

Both squatter appropriations of space and early craft beer contestations of taste emerged not only in opposition to the (seemingly more ‘abstract’) forces of transnational capital, real estate speculation, and industry consolidation but through (seemingly more ‘concrete’) everyday sensory engagements with sensuous environments – like derelict neighborhoods and supermarket shelves lined with bland pilsners (see also Cohen 2018; Felton 2018). Residents linked their everyday sensory experiences to critiques of forces operating across scales and, in this way, their opposition was also about the production of new sensuous environments. Amsterdam’s “squatters gained significance as a movement against the... imposition of modernist fantasies on urban space,” by “preventing space from being redesigned to maximize profit” (Uitermark 2009, 351). The early Amsterdam craft beer scene began to coalesce against modern industrialized brewing, opposing the situation in which taste ‘seemed to take a backseat to price’ resulting in a ‘monoculture of taste’ (Dijksterhuis and Kaldenbach 2018, 11) and the “impoverishment of the brewing landscape” (Dijk, Kroezen, and Slob 2018, 282). Like the squatters, the early craft beer scene saw, felt, heard, smelled, and tasted the subordination of use-value to exchange-value, which they tried to resist by creating a more sensuously diverse beerscape. This diversity remains central to the craft beer scene in Amsterdam and the Netherlands today. According to CRAFT, the association of independent Dutch brewers: “Dutch beer culture does not excel with a specific beer style... Dutch craft brewers excel in diversity. The diversity of the CRAFT members is our strength... Together we add color to the beer landscape in which the vast selection consists of lager” (CRAFT 2020, online). At the same time, it must be recognized that the intentions of the early craft beer squatters to subvert capitalist industrial production gave way to a more general interest in taste diversity, and craft beer became enrolled in city-making projects, material and symbolic, quite at odds with squatter productions of space.

### **Good Taste or Gentrified Taste?**

All three of the early squatter-associated craft beer projects discussed above still exist: Bier & Co, Bierkoning, and Brouwerij ‘t IJ; although all are currently under different ownership. Bier & Co is owned by the second largest brewery in the Netherlands (behind Heineken) while multinational corporation Duvel Moortgat NV owns a share of Brouwerij ‘t IJ. In Amsterdam today, craft breweries are as likely to replace squatted spaces as contribute to them. For example, in Amsterdam Oost (East) a brewery was recently founded on previously squatted land. The community cultural center that the squatters had established there was forcibly



evicted as part of the urban redevelopment of Oostport. Now, the land is owned and rented to them by a real estate developer large and profitable enough that, tragi-comically, it is less interested in accumulating money capital than cultural ‘capital’ from the property. As the owner of the brewery explained to me:

It’s a very reasonable contract and they like it. They don’t really do it for money. They’re developing huge projects in the city and they wanted to have one kind of small sophisticated brewery, and they’re often here.

*I ask: It’s good for their image?*

Yeah, they organize a party once a year with their employees. They like the project. It was a pitch. We did a pitch against seven other experienced horeca [hospitality, restaurants, catering] entrepreneurs in Amsterdam and we won it because the real estate developer thought it was the most original idea.

The notion of ‘good taste’ as ‘sophisticated’ is a different kind of ‘alternative taste’ to mass produced pilsner than the ‘good taste’ that mobilized some of Amsterdam’s early craft brewers; and, as such, entails different relations to the production of space. Indeed, a number of scholars have shown (critically and otherwise) how craft breweries are part of gentrification and other dynamics of urban revitalization (Barajas, Boeing, and Wartell 2017; Cabras 2017; Hubbard 2019; Mathews and Picton 2014; Nilsson and Reid 2019; Reid 2018; Reid and Gatrell 2017; Wallace 2019). These dynamics between beer, taste, and space are about more than ‘local’ urban changes and, furthermore, can be understood socioecologically (Smith 2010; Quastel 2009). Questioning the ‘craft beer revolution’ in the United States, Jordan (2016, 1) argues: “When tastes change, landscapes change as well”; tracing connections to hop and barley agriculture and the sociospatial ramifications of brew pubs (see also Freedman and Freedman 2007). In his historical-geography of hops, Kopp (2014, 77) shows how:

Over time, hop agriculture transformed physical, cultural, and economic geographies of temperate regions across the planet. Like the climbing plant, those transformations entangled stories not only of brewers and beer drinkers, but also of farmers and their land, businesses, scientists, and government agencies.

These political ecologies reaffirm the transformative potential of taste, and therefore possibilities for producing other, perhaps more just, agri-food systems. At the same time, in revealing complex socioecological, or metabolic, entanglements, they challenge binary notions of an ‘alternative’ as ‘outside’ a reified ‘industrial

capitalism’ – even more so notions of a ‘return’ to the ‘traditional’ – thus throwing into question just what another agri-food system may look, and taste, like.

## **Laboring Taste, Producing Value**

While tasting has always been part of brewing, different organizations of brewing also entail different organizations and practices of tasting. “How the work of sensing is mobilized by a range of actors depends upon the temporal, economic, technological and cultural milieu in which sensing occurs” (Spackman and Lahne 2019, 149). The ‘twentieth century upended what it means to taste’ through the development of sensory sciences within, alongside, and in service of the food and drink industry’s increasing mechanization, standardization, and rationalization (Heymann 2019). Much as the expansion of early capitalism depended on new quantitative ways of seeing and knowing, such as the cartographic knowledge so central to the Dutch East India Company, the expansion of industrial brewing was underpinned by new ways of tasting and knowing: “the co-production of Nature [including ‘human nature’] as something to be mapped, rationalized, quantified, and above all, controlled in ways that eased the endless accumulation of capital” (Moore 2015, 62). Sensory science enacted new epistemologies and ontologies of sensation that facilitated the mobilization of tasting as a form of atomized labor necessary to industrial capital accumulation. This was not only part of how and why the taste of the 1980 Amsterdam beerscape was so homogenous, but part of wider socioecological transformations as “the industrialization of the food industry provided the indispensable basis of the type of urban life that was being created” (Braverman 1998, 182). Sensory evaluation, although largely unappreciated in the everyday purchase and use of commodities, “plays a key role in shaping the actual lived-in (alimentary) environment we inhabit in the late-industrial world” (Lahne 2018, 7).

## **Sensory Science and Monopoly Capital**

The terms sensory evaluation, sensory analysis, and sensory science are often used interchangeably, demonstrating the impossibility of disentangling industry and science in the history and practices of sensory evaluation. Sensory science was part of the scientific-technical transformation of production processes that Braverman (1998) argues were interrelated with the development of scientific management and monopoly capital. The ‘instrumental revolution’ in chemistry mid-20th century proceeded through the replacement of human labor with other detection and data producing technologies (Borg 2020). Today, most foods

have had some kind of interaction with a sensory scientist (Heymann 2019). The concentration and centralization of capital in the beer industry, involving expanding volumetric and geographic scales of production, has been enabled, in part, by sensory science and the ‘taming’ of raw materials’ ‘natural’ variations into a consistent commodity.

Sensory evaluation is fundamentally about the transformation of individuals’ subjectivity into objectivity through standardized methods that produce communicable, actionable, and, ideally, profitable information. This possibility relies on the (explicit) assumption that ‘certain sensory stimuli are inherent’ to what is being tasted and are therefore ‘valid or true,’ while others are ‘biasing or false’ because they are ‘only correlated or associated in context’ (Lahne 2016). “[I]t is a business dedicated to world-shaping, built on the epistemological strength of its objectivity-securing methodologies” (Lahne 2018, 12). The panel is fundamental to sensory evaluation. In general, there are three kinds of sensory evaluations (Lawless and Heymann 2010). Hedonic or affective tests quantitatively evaluate how much a product is liked or disliked. Descriptive tests quantitatively evaluate a product’s perceived sensory characteristics. Discrimination or difference tests evaluate perceptible differences between products. Despite these evaluations having different purposes, each shares a certain basic methodology: the use of a panel of tasters, standardized experimental procedures, and the aggregation of data to be analyzed. The panel is a methodology intended to produce ‘more reliable judgements’ than a single individual, expert or not:

In the past, production of good quality foods often depended upon the sensory acuity of a single expert... This was the historical tradition of brewmasters, wine tasters, dairy judges, and other food inspectors who acted as the arbiters of quality. Modern sensory evaluation replaced these single authorities with panels of people participating in specific test methods that took the form of planned experiments. (Lawless and Heymann 2010, 4)

Industrial sensory evaluation is not about capitalizing on a specific scientific knowledge but capitalizing on the authoritative-scientific production of knowledge (Braverman 1998, 115).

For Marx, the important distinction between what he calls manufacture and large-scale industry is that the production process is no longer organized by the skill of the worker but instead the ‘demands of the commodity.’ Industrial sensory evaluation reformulated sensory acuity from a practiced expertise to a practice of labor management; ‘good taste’ now emerges from the proper execution of sensory evaluation panels. The wide application of scientific management and

scientific-technical transformations to production are about increasing labor productivity: “management sets itself the problem of grasping the process as a whole and controlling every element of it, without exception” (Braverman 1998, 118).

Take Heineken, a company whose advertisements emphasize their beer’s consistency of taste across time and space (Sluyterman and Bouwens 2014, 317). As the brewery conglomerate expanded internationally further social and spatial divisions of labor emerged:

Heineken attempts to ensure that beer reaches the consumer in perfect condition, so it operates a freshness policy, which is related to distribution channels. All products are coded so that they can be traced throughout the supply chain, allowing the company to identify the source of any problems that may arise. The effectiveness of these policy measures, which are implemented at local level, is monitored centrally. Beer samples are analyzed and tasted in systematic way by local laboratories. For corporate brands like Heineken and Amstel additional sensory and analytical testing takes place in Heineken’s central laboratory in Zoeterwoude, the Netherlands. (Vrellas and Tsiotras 2015, 49)

All the Heineken beer that circulates through the Amsterdam beerscape comes from a batch brewed and taste-tested at their behemoth Zoeterwoude brewery, the largest brewery in Europe. In a National Geographic (2011) documentary the narrator says: “Zoeterwoude brewery relies on the very latest technology. As well as the eyes, noses, and taste buds of an army of 1600 beer makers.” Sensory labor, then, is clearly fundamental to the production and realization of value which is at the same time the production of environments and bodies.

## **Sensory Awareness at the Craft Brewery**

Sensory evaluation differs at every brewery, and while these differences generally sort into a spectrum based on production scale, that’s not always the case. Actually, the majority of the Dutch breweries are extremely small, and many don’t do any kind of regular sensory evaluation (Kempen 2018c; 2018a; 2018b); however, those producing the vast majority of the country’s beer do, including the larger craft breweries. Jen, a craft brewery quality assurance expert (she may be hired as an employee or as an outside consultant to address particular problems and train workers), finds it disappointing but not surprising: “Sensory often gets overlooked by small breweries because there’s a lot of expensive products out there, but you don’t necessarily need them. A lot of people in beer have a scientific mindset

and think a small set of data isn't going to be statistically significant anyway.” Jen encourages breweries of all sizes to think about sensing beyond laboratory equipment and formal beer tasting panels, and instead as distributed across the production process:

Every single person in the brewery should do some sensory training and practice. It should start with the first person who gets in the morning. The minute you open a bag of grain you should be looking at it really closely, smelling it, just making sure that you open the right bag. You should be checking the water in the tank. You need to be smelling it, looking at it, tasting it. In the cellar you have people monitoring fermentation, so you're going through and checking the pH of every tank, you're checking gravity, how far along is it. That's a really good opportunity for people to be smelling and tasting the beer in progress to make sure that nothing is going wrong. Making sure it's ready to be dry hopped and transferring it into the bright tank and making sure everything is the way it should be.

She works to cultivate mundane, widespread sensory awareness. At a medium-sized brewery there might be daily and relatively casual sensory check of all the in-process beer done by an individual and then more formal weekly sensory evaluation panels for finished batches. Both require some sensory training or at least tacit experience, but while there's no need for a daily panel unless something seems off, they do have one each week. Sensory evaluation panels can address a number of questions and issues. The purpose of a sensory panel is to ask: What does it taste like? Is it true to brand? Does it fit within brand standards? Is it true to target? Is it what we meant to make? Is something different? How much do we like it?

How does one know what to taste for? The most common answer, by far: “experience;” followed up with a reassuring: “but you can also train it.” Ingold's (2017, 2) thinking on education, as “a practice of attention, not of transmission – that it is through attention that knowledge is both generated and carried on,” is helpful here. Interestingly, one of the first parts of sensory evaluation training is a quick explanation of sensory science's theory of perception, which is the only part that could be described as transmission-like, but which also is not conveyed as particularly necessary to understand in order for us to move on. Instead, the emphasis is on practice through attention. At one training I attended, Jen's presentation to the employees included some general advice for a daily panel:

Come prepared and stay focused; Part of daily tasks, not a ‘beer break’; No

perfume, smoking, or coffee; Do not distract other tasters; Focus and be specific; Take a moment to really focus on the product and be honest in your descriptions; Don't worry about being 'correct'!; Just be honest, everyone is different; There is only one way to get better at tasting; There are many ways to taste, and consistency is important; Practice makes perfect.

## **Taste Labor and Instrumental Embodiments**

Sensory scientists Lawless and Heymann (2010, 2) write that: "A sensory scientist who is prepared for a career in research must... understand products, people as measuring instruments, statistical analyses, and interpretation of data within the context of research objectives." Braverman (1998, 119) notes that 'the reduction of the worker to the level of an instrument,' the treatment of 'workers themselves as machines,' is an aspect of scientific management developed by followers of Taylorism who identified 'elementary components of motion' using machine terms. Indeed, the job of tasters to become measuring instruments is explicitly repeated throughout sensory evaluation training. "We use the human body as an instrument to measure the human experience," as it was put during one training.

Sensory evaluation training at a brewery is fundamentally about two things: developing individuals' sensitivities for isolating flavors and developing a shared language to communicate those sensitivities. Describing the training, or better put the calibration, process, Jen says:

It's a lot of isolating things. So that first intro level class we do little cups with basic flavor standards. So, it's a salty water, that's it. Here's a slightly salty water and here's a very salty water and then a bitter and a sour... So, it's an exercise in isolating these things and teaching yourself. It's like anything, there's only one way to get better and that's by continuing to do it. It's a lot of practice and a lot of standardizing. You would also apply that logic to spiking samples with an off-flavor. So maybe I would do sensory by spiking at a moderate high amount that I would expect everyone to identify.

To actually set up a sensory evaluation program in a brewery, however, requires more than attuning individual bodies:

So going into something like that I want to make sure that all the staff members have a good understanding of basic tastes – sweet, sour, salty, bitter, arguably umami but most breweries don't deal with that one much – and how that differs from the aromatics that you'll taste. I've run into a lot of people who confuse bitter and sour and a lot of people confuse the aromatics of hops with

bitter. So, trying to make sure people are trained with the right vocabulary so that everyone on your panel is using the same language to describe what they're experiencing. Trying to make sure everyone is on the same page about what they're describing and how they're describing it is the number 1 step in starting a sensory program. (Jen)

Calibration is achieved through the specification of tasting practices, collective discussions of experiences, and the use of standardizing technologies, including commercially produced off-flavor samples, the Beer Flavor Wheel developed by Morton Meilgaard in the 1970s that organizes descriptor terms, and structured sensory evaluation sheets. For sensory evaluation to produce a 'good sense' of a beer, then, involves distributing sensing across individuals and panels as well as across human and nonhuman instruments. This production of instrumental bodies impacts them beyond the brewery walls. As one participant told me: "Drinking beer in this way means I'm not able to enjoy it that much. Even outside of work, I can't really just drink and enjoy a beer. I'm always dissecting it."

## Sharing Taste, Producing Data

Rather than being simply a passive object of the gaze, the city is a hyperactive space continually refashioning the senses and how we think about them. (Defazio 2011, 54)

Data, including geosocial network content unevenly imbues the mediatised Amsterdam beerscape. Geosocial network Untappd collects standardized taste data from individual users that, in the aggregate, informs users through maps and recommendations that (potentially) shape their beer drinking. One example of how "the practices of everyday life have become increasingly infused with and mediated by software" (Kitchin and Dodge 2011, 3). Boy and Uitermark's (2015; 2017) research on Instagram and Amsterdam shows how (geo)social network content generation "reflect and reinforce processes of gentrification as Instagram users partake in the aestheticization of everyday life and promote places of high-end consumption" (2017, 612), arguing that "social media partake in reassembling the urban landscape" (2017, 622). This 'aesthetic economy' mobilizes all manner of aesthetic work, paid or not, in value production (Michalski 2015, 24). At the same time, new subjectivities emerge, such as that of the 'user' (Lefebvre 2014, 752). Lefebvre presciently noted tendencies toward assimilation, repetition, and equivalence in everyday life, which increasingly internalizes a 'technocratic ethic': "every moment anticipated, quantified in money terms, and programmed



temporally and spatially” (2014, 731). According to Arboleda (2015, 36), who brings together theories of immaterial labor with UPE,

a new frontier of capitalist expansion centered on digital technologies, new divisions of labour, and an intensifying role of affective and mental assets in commodity production... has profoundly transformed practical activity – and hence the way in which urban environments are produced.

### **UnTappd: Drink Socially**

Not a physical location but a shifting network, an ebb and flow of information and attitude. An ethereal presence at my desk, my dining table, at the bar, in the festival tent, on a hillside. It’s all about the interaction, only the assembly of likeminds and dialogue is via social media rather than face-to-face. It’s the virtualisation of latter-day café culture, where the sense of place is bound no longer by walls but by bandwidth. (Johnson 2010, blog post)

Untappd is a geosocial networking service that allows beer drinkers to keep track of their consumption, share this interactively with other users, and find new places and beers to drink. Founded in 2010, Untappd is now widely considered a ‘go-to’ app for (craft) beer drinkers. Over 7 million users have entered over 800 million ‘check-ins,’ the term for recording a beer consumed to one’s profile.<sup>2</sup> Although Untappd is based in the United States it is used around the world, particularly in Europe. In 2017, the Netherlands was the country (other than the US) with the most check-ins, over 6 million, ahead of, the four times more populous, United Kingdom. The same year, Amsterdam had the fourth most check-ins of any city outside the US, with 432,147 and by 2019 that number had nearly doubled, reaching 747,107. Beyond drinker check-ins, many Amsterdam breweries and venues are active as well, meaning they upload and update their menu, post and participate in events, and interact with the users that check-in their beers (breweries) or locations (bars).

In addition to creating an individual beer journal, the app provides a map of nearby ‘venues,’ ‘breweries,’ and ‘events,’ as well as ‘discover’ lists of ‘trending beers,’ ‘trending locations,’ ‘top rated beers,’ and ‘top rated breweries,’ and also generates tailored beer recommendations. As co-founder Greg Avola (2019) said in a recent interview: “The goal of Untappd is to be able to tell people where to go, what to drink, and who to hang out with – for lack of better words.” The

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2 All statistics in this section are taken from Untappd’s blog (blog.untappd.com) and Facebook page (facebook.com/untappd).

app even tries to facilitate getting them there by including a ‘get a ride’ button that is integrated with Uber. Untappd, then, thoroughly permeates the beerscape, seeking to both record and shape users’ socio-spatial beer drinking practices and preferences. In this way, “the practices and spaces of everyday life are produced at the moments or sites of multiple conjunctions of code, content, social relations, technologies, and space/place” (Leszczynski 2015, 732).

Like other social media platforms, Untappd is coproduced by the labor of designers and developers who create the code that ultimately “allows for the guiding of end-users along certain paths of consumption selected for by the very data they and other users have generated” (Thatcher 2017, 2710). As well as by users, whose taste-data-generating activity is performed in the not-so-hidden abode of (sharable) consumption, on whose threshold hangs a sign: “Come in! Check-in! We’re open!” To use Untappd you simply check-in when you drink a beer. First, search for the beer you drank and then fill out the check-in form with as much or as little detail as you like. As long as you select a beer you can check-in, how much more to include is up to you. You can write a 140 character or less note (the prompt says, “How was it?”), add a picture, rate the beer on a 1-5 scale (.25 increments), select the serving style (draft, bottle, can, etc.), tag friends, add the location you drank it, add the location you purchased it, and compose a flavor profile from the long, eclectic list of tags provided (a few examples: light, acetaldehyde, crushable, intense, juniper, mouthfeel, synthetic, yeasty). You can also easily share your check-in to other social media networks like Facebook, Instagram, and Twitter.

## **The Casual Scientific Taster**

If, as beer historian Unger (2005, 1) has argued, “the scientific basis for Dutch brewing after the 1870s separated it from its predecessor... [through] a series of changes in the understanding of brewing and how people were to practice the trade after the nineteenth century,” birthing the figure of the ‘scientific brewer’ (Glamann 1984). Then perhaps the changing understandings of sensory perception in the mid 20th century birthed the figure of the ‘scientific taster,’ most obviously in the form of the sensory evaluation panelist. However, the scientific taster has wandered out of the brewery laboratory and into the pub, phone-in-hand.

Commonly discussed is ‘rating philosophy,’ as some interlocutors called it, the question of how and why to numerically rate the beers that a user checks in. The quantification of users’ taste is simultaneously a lynchpin of Untappd and its most contentious aspect. As one user put it: “What I don’t like about Untappd is the point system... taste is so subjective and what I don’t like someone else will. It’s the rating system I don’t like.” For some users, ratings are about the technical,

as opposed to the personal: “There’s people who rate based on their preference and others based on execution of the style. I tend towards the second. How well is the beer executed? Is there anything they could have done better?” And vice versa: “My ratings are subjective. There are beers that are technically good but I rated low and there are more mediocre beers that I rated high because I enjoy the style.” Of course, making this distinction requires a certain kind of knowledge about beer. The second commenter may rate based on their preferences, but they still claim to have a technical understanding. There are those that agree that rating should be based on technical execution, but don’t always feel able to make such a judgement and so check in without rating: “I don’t rate styles I have only had once or twice and don’t know what they should taste like.” The most common sentiment amongst the Untappd users I spoke with: “I try to only rate the beer if it’s a style I actually enjoy. Basically, I don’t want to hurt a beer’s score because I don’t like the style that’s not fair.” Here ratings are about fairness, the user’s obligation to be fair to the beer and brewery with their rating. Instead of the fairness of their rating hinging on their technical knowledge (or lack thereof), it hinges on distinguishing between not liking a specific beer and not liking a style. In a sense the ‘objective’ ‘accuracy’ of this data doesn’t matter, that’s not what makes it valuable. The system has become one of data accumulation for data accumulation sake.

## **Taste Data and the Beerscape**

With every check-in, Untappd users transmogrify taste into data that becomes the private property of the company. It’s free to use Untappd but only by becoming a paid ‘supporter’ (for \$4.99/month or \$49.99/year) can users access their own ‘raw’ data. Checking-in generates data that is in a standard format that facilitates specific forms of communication, aggregation, and exchange. It also, in part, generates particular visualizations and tactilities of taste. Flavors are translated through gestures interfaced with touchscreens into ‘tags’ limited to a predetermined shared vocabulary; preferences translated into numerical ratings expressed with star icons; experiences translated into charts, graphs, and other analyses. Sensuous practice, the activity of tasting, is objectified into a ‘thing’, taste-data that is appropriated or alienated.

In geosocial networks, “users act as a sort of sensor using mobile devices to produce vast amounts of data related to various urban and social aspects, that may be a rich source of information supporting decision making of individuals, businesses and cities” (Santala et al. 2017, 238). As Lefebvre (2014, 817) notes, information is a peculiar commodity that has the characteristic of causing other commodities to be purchased and sold. The value of information is exemplified

by the purchase of RateBeer by AB InBev, the world's largest brewery in 2019:

By acquiring RateBeer, AB InBev now owns a treasure trove of data, including the preferences and locations of active and passionate beer drinkers. One corporation now has the power to watch, analyze, predict, and, eventually, create the beers we like by using data many of us volunteered willingly under different circumstances. (Wolinski 2019)

Regarding Untappd, beyond the re-presentation of data to users in the form of recommendations and more, the company sells analytics to venues, breweries, and other supply-side users. In this way the user-produced taste-data continues to circulate through the production and consumption of the beerscape. This can include shaping the built form of the beerscape since Untappd information might be useful in determining the location of new breweries and pubs, amongst other strategic business decisions (Silva and Graeml 2016). As Goodman, Johnston, and Cairns (2017) argue, mediatization co-produces foodscapes in such a way that food media has become a nexus of capital accumulation and the biopolitics of everyday life.

## Conclusion

In this article I have shown how the activity of taste is engaged in producing space, value, data, and, in this way, urbanscapes. The 'urbanization of nature' is not only taste-able but mediated by the practical activity of tasting, serially performed throughout the metabolic circulation of beer. The beerscape extends beyond 'the city' as "urban socio-ecological conditions are intimately related to the socio-ecological processes that operate over a much larger, often global, space" (Heynen, Kaika, and Swyngedouw 2006, 7). Despite the 'craft beer revolution' and the explosion of new breweries, the Amsterdam beerscape is still underpinned largely by the circulation of industrial pilsner beer (Jongh, Geerlings, and Tramper 2019). Instead of conceptualizing a 'craft beerscape' separate from an 'industrial beerscape', along the same lines of some alternative food network researchers (Johnston and Baumann 2015; Morgan 2010; Psarikidou and Szerszynski 2012), it seems circulations of knowledges, practices, commodities, money, labor and more complicate the bounding of, 'craft' and 'industrial' production (Adamson 2013; Blundel and Smith 2013; Kroezen and Heugens 2019; Sonnino and Marsden 2006).

Increasingly, through the scientization of the senses, sensory labor, and standardized mediations, a kind of 'abstract taste' has emerged that is imminently

exchangeable. At the same time, there are more beers and ‘concrete’ tastes than ever, both beers and drinkers emphasize the unique-ness of their taste, and there is a growing division of taste labor; all of which contribute to the fragmented particularity of taste. ‘Natural’ taste variations are subject to equalization through quantification, panels, averages, and standardized lexicons; and, at the same time, further fragmentation through the division of taste labor, the promotion of individual preferences, and uneven sensuous geographies. Echoing Neil Smith on uneven development, Orzeck (2016, 504) maintains that “the production of difference, the differential valuation of bodies in different spaces and scales, is inherent to the capitalist mode of production, as inherent as the constant production and reproduction of spatial difference.” Indeed, as this article has shown, the production of space and the production of bodies is intimately intertwined.

I understand the question of ‘good taste,’ and its potentialities for political-ecological transformation, to be at the nexus of these contradictory tendencies of taste equalization and fragmentation. As a political project, ‘good taste’ must be somehow shared amongst large numbers of spatially dispersed, socially differentiated, and sensorially-particular individuals going about their everyday lives in relation to their various socioecologies. However, at least for Moore (2015, 288), an ‘agro-ecological alternative’ “can only be realized – can only be organized in the present – through a class struggle that redefines what is valuable (and what is not) in the civilization we wish to build.” It seems to me that there are limited number or modes of understanding, questioning, or proposing the good in ‘good taste’. ‘Good taste’ cannot only be about the citizen-consumer and consumer choices (Mol 2009) but the laborer, the work of taste, and the variegated more-than-human assemblages involved. Is there then some potential for producing more just food systems, urbanization, and everyday life through a political-ecological project of ‘good taste’? Perhaps, as Kaika (2017) has suggested regarding the perpetual onslaught of technocratic ‘solutions’ to environmental ‘problems,’ it’s time to change our interlocutors. It’s not only the sensory experiences of craft beer drinkers or organic farmers market shoppers that matter and contribute to producing urban landscapes, nor are they the only ones who have ‘good taste’ and thus a monopoly on determining the ‘good.’ First, we need to dispel the notion that the senses, and especially taste, only have to do with leisure and consumption and instead explore all manner of situated sensuous practices engaged in making our uneven worlds.

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# Circular Cities and Imaginaries: New Urban Infrastructures and Materialities as Transition Pathways to a Post-Growth Planning Paradigm

## Abstract

In this article we critically examine the role that ‘circular’ urban infrastructures play in facilitating the transition from an idea to a collective practice for social, economic and environmental transformation. Although circular economies and cities receive ample attention as ‘the new normal’ for planning ‘sustainable’ futures, thus far, scholars have paid little attention to the process of embedding ideas and economic values into urban materiality and urban everyday life. We argue that the proliferation of brand-new artefacts and infrastructures connected to the circular economy are as important as circular imaginaries for creating pathways towards socio-environmental change. These highly visible, tactile urban infrastructures act as ‘wish-images’ for a potentially better world; they tell stories about the future; they have the power to transform shared values. We argue a critical examination of the role of circular infrastructures is imperative in order to better assess whether the circular city vision can indeed become a pathway towards a new post-growth paradigm; or whether it will remain a techno-fix driven fantasy operating within the growth-driven paradigm. Our exploration is empirically grounded in the examination of circular infrastructures and beer economy in the city of Amsterdam which has declared itself a ‘pioneer’ of urban circularity.

# The Circular Imaginary: a transition pathway to alternative futures

When... the [modernist] city [turned] into a theatre of accumulation and economic growth, urban [infrastructure] networks became the [urban dowry] of [the modernist city]: the iconic... shrines to a technologically scripted image and practice of progress... They tempered the fear of the new, created an image of continuity, while their spectacular adornment suggested a triumphant future. (Kaika and Swyngedouw 2000: 121)

This article critically examines the role that ‘circular’ urban infrastructures play in supporting and facilitating the transition from a singular idea (the circular city) into a collective imaginary and practice for social, economic and environmental transformation (Jasanoff and Kim 2015).<sup>1</sup> The circular city is increasingly perceived as the 21st century’s answer to recurring criticisms about the stalling of imagination and practice in urban planning over the past half century (see Swyngedouw and Kaika, 2003; Kaika and Swyngedouw, 2014).<sup>2</sup> Policy makers and scholars alike often depict the circular city as a new master narrative, a wish-image, and a planning paradigm that can potentially establish a “transition pathway” to a future that better addresses socio-environmental challenges (Luederitz, 2017; De Angelis and Ianulardo, 2020).

However, despite the growing policy and academic attention on circular ideas, values and imaginaries, scholars have paid little attention thus far to the process of embedding these ideas and values into concrete material and institutional practices that can enable the transformation from an (individual) idea to a (collective) imaginary and social, economic, and planning practice (Jasanoff and Kim 2015). This article does just that.

Through an examination of circular buildings, pipes, street furniture, commodities, construction materials, and artefacts in Amsterdam, a city that has positioned itself as a “pioneer” of circularity since 2015 (Gemeente Amsterdam, 2015a, 2015b), we contend that the proliferation of these new iconic

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1 See also Berlant’s (2011) exploration of how it is not only the content of objects/scenes of desire that matter but the promises they carry and their magnetic capacity to hold together clusters of affects.

2 At the beginning of the 21st century, Swyngedouw and Kaika (2003) noted the lack of a vision of a better world compared to that of early 20th century urban reformers. A wide range of scholars have also noted a more general dearth of social, political, and emancipatory imaginations; from Sontag’s (1966) discussion of apocalyptic imaginaries in media to Muñoz’s (2019) critique of academia’s prevailing ‘climate of anti-utopianism’ (see also Haiven and Khasnabish, 2010; Giroux, 2014; Haiven, 2014).

circular infrastructures is arguably more important than circular discourses and economies for creating a pathway towards socio-environmental change. We show how circular urban infrastructures are central in translating circular city ideas and values into urban planning and design practice and into urban everyday life and socio-economic activity. They act as wish-images for alternative futures; as artefacts that tell alternative socio-environmental stories; they have the power to transform shared values – what matters for whom, what is desired by whom, when we should act and how (Castoriadis, 1987: 145; Buck-Morss, 1989: 110; Kaika and Swyngedouw, 2000; Kaika, 2010).

Examining these brand-new, highly visible, and tactile artefacts and infrastructures connected to circular economies can enable us to explore better whether circularity can indeed become a radical urban imaginary for building an alternative future; or whether the translation of circular imaginaries into material and institutional practices offers simply a new techno-fix, another post-political narrative that ensures nothing changes (see Wilson and Swyngedouw, 2014).

The questions we ask are: whether the vision for a circular society remains one of commodified basic needs (e.g. housing, water, food), broadening global inequalities and technocratic solutions to socio-environmental ills? Or whether commoning practices can prevail in a pathway towards a shared circular future with less resource extraction. This article is a first open exploration of these questions. As circular economies and circular cities are fast “becoming the new normal” when it comes to planning for “sustainable” futures (PriceWaterhouseCoopers, 2019), a more critical examination of circularity along these lines becomes imperative.

As both ‘circularity’ and ‘infrastructures’ are terms used increasingly liberally by academics, policy-makers, activists and other stakeholders<sup>3</sup> it is necessary to note here that this article uses the term ‘circularity’ to describe the set of scholarly and policy ideas and practices that share an understanding of the city as an assemblage of circulatory conduits comprised of technological networks that mediate flows of goods and services, and regulate the metabolic relations between humans and the environment. For the term ‘infrastructures’ we adopt their depiction by Graham and McFarlane (2014: 1) as “not just a ‘thing’, a ‘system’, or an ‘output’, but a complex social and technological process that enables – or disables – particular kinds of action in the city.” Berlant (2016: 393) describes this process as “the living mediation of what organizes life: the lifeworld of structure.” Similarly, Larkin’s (2013) review of the anthropological

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3 For definitions of circularity see Geizen (2018), Nogueira et al. (2020) Williams (2020). For infrastructures see Star (1999); Kaika (2005); Larkin (2013); Graham (2015); Aanad et al. (2018); Lawhon et al. (2018).

literature emphasizes the world-making politics of infrastructure. While a number of scholars have explored the social and institutional infrastructures that underpin circularity, we use the term ‘circular infrastructures’ to delineate the physical structures and objects that are purposefully designed to materialize and express what policymakers, planners, architects, and businesses describe as new circular relationships between social and ecological systems.

The pioneering work of Cornelius Castoriadis (1987), Benedict Anderson (2016), and Charles Taylor (2004), in particular, brought into scholarly focus the importance of examining social imaginaries, “the ways people imagine their social existence, how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deeper normative notions and images that underlie these expectations” (Taylor 2004: 23). An interdisciplinary body of recent scholarship has examined sociotechnical imaginaries (Jasanoff and Kim 2015), environmental imaginaries (Lawhon, Pierce, et al., 2018; Wachsmuth and Angelo, 2018), architectural imaginaries (Kaika, 2010, 2011), engineering imaginaries (Björkman and Harris, 2018; Augustine et al., 2019), and infrastructural imaginaries (Nielsen and Pedersen, 2016; Anand et al., 2018; Björkman, 2018; Lawhon, Nilsson, et al., 2018). One of the key questions asked by this literature is why societies follow certain paths and not others, why and which particular social, spatial, and environmental formations are developed and sustained. These scholars have investigated how science, technology, media, architectures and infrastructures are involved in not only generating new imaginaries but materializing and embedding them into everyday, collective, and institutional practices. Jasanoff and Kim (2015: 323) describe this as ‘extension’, the power-laden process through which new ideas “gain traction, acquire strength, and cross scales.” Our exploration of circular infrastructures and commodities emphasizes the important, but thus far understudied, role that the production and design of these new urban materialities seeks to play in embedding or extending policymaker, planner, designer, and corporate visions of a circular future into the everyday lives, practices, and imaginations of urban denizens.

The argument in this article is built upon original material from fieldwork on the circular transition in Amsterdam conducted between 2017-2019. The fieldwork methods included: archival search at the state archives of Amsterdam and historical archives of the Heineken foundation; interviews with policy makers, and partners in businesses engaging with circularity in Amsterdam and the Netherlands; field observation in the city of Amsterdam; and discourse analysis of contemporary policy documents, position papers, and reports issued by local and national governments, intergovernmental organizations, think tanks, research institutes, industry associations, corporations, architecture and design

firms. Once particular circular projects, infrastructures, and commodities were identified through these publications, we collected further information through online searches of newspapers, websites, advertising campaigns, magazine articles, and conference presentations. A full list of the sources is given in the beginning of the bibliography.

The material we derived from archives, interviews, observation and reports was analyzed based on three key research aims: (1) to elucidate the planning paradigm and imaginary of circularity in Amsterdam, and more broadly; (2) to examine the role of new urban infrastructures in stimulating a circular transition, and put them in historical context; and (3) to use the beer industry as an empirical case study of how socio-environmental imaginaries are embedded into urban materialities. The third point became central in our research somewhat unexpectedly. While reviewing the Dutch state's and Amsterdam municipality's visions and proposals around circularity, frequent references to beer were made as an exemplary industry for the city's circular transition. Hence the infrastructures and circularity of beer production and consumption became a central empirical focus of our work and this article.

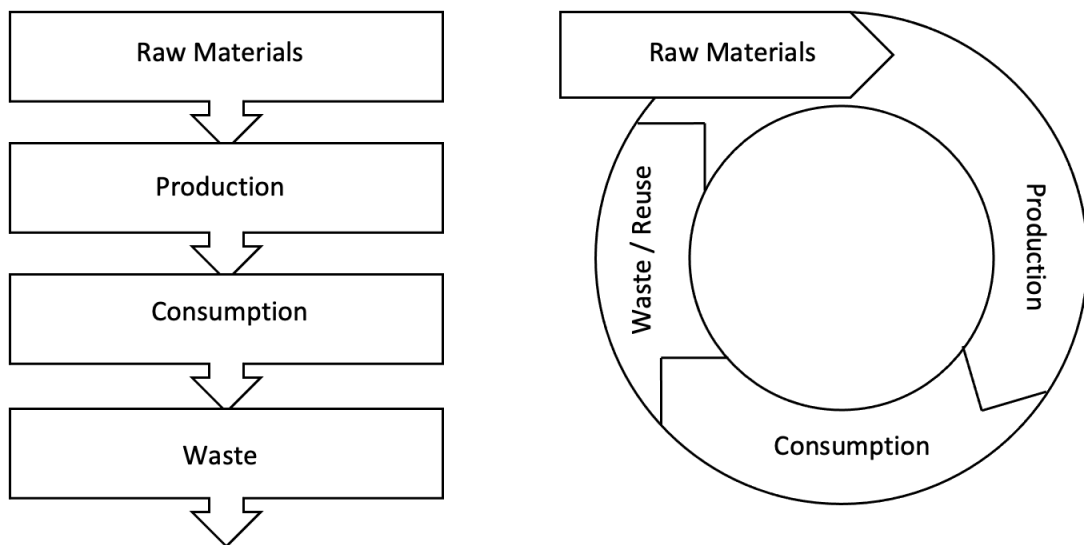
## **From circular imaginaries to circular infrastructures: designing the “dowry” of a postgrowth city**

Although rigorous scientific analysis heavily disputes the possibility of decoupling growth from resource extraction and exploitation (Bithas and Kalimeris, 2018; Skene, 2018; Hobson, 2020), circularity is fast gaining approval as the new planning paradigm through which states and businesses can provide answers to the environmental challenges of the 21st century (Arciniegas et al., 2019; Remøy et al., 2019; Circle Economy, 2020).

In 2020, the UN and the EU joined a large number of international, national, and local institutions in adopting a circular economy model as a principle and strategy for recovery, rebuilding, and resetting a ‘post-COVID’ world (C40 Cities, 2020; European Commission, 2020; Ellen MacArthur Foundation, 2020). During the same year, the C40 mayors announced that (circular) cities are fundamental for a “green and just recovery” (C40 Cities, 2020),<sup>4</sup> while the CEOs of many international corporations and NGOs depicted the circular economy as a central principle for “building back better” (Ellen MacArthur Foundation, 2020). The Netherlands is at the heart of these debates, as it has been promoting itself as

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4 The C40 consists of a global network of 94 megacities, representing more than 700 million citizens and 25% of global gross domestic product.



**Figure 1: Diagram by authors representing linear versus circular economies**

a hotbed of circularity for almost a decade now. Although there is neither an agreed definition<sup>5</sup> nor an agreed practical pathway towards establishing a circular city (Korhonen et al., 2018), the key principle shared amongst emerging circular city narratives is that the reconfiguration of metabolic circulations of goods and services in a city can help decouple “value creation from the [extraction and] consumption of finite resources” (World Economic Forum, 2018: 10) (see Figure 1).

As circularity is fast becoming a new master narrative for post-growth urban futures, it also starts becoming “endowed” (Kaika and Swyngedouw 2000) with new material pathways towards this change (Luederitz, 2017). Over the past decade we saw a proliferation not only of institutions that promote circularity, but also of new technologies and infrastructures trying to give material form to circular visions. A new range of circular commodities, artefacts, and technological networks promise to fix our socio-environmental ills by supporting and delivering transitions to zero carbon footprints. These new circular infrastructures become increasingly visible in and around urban landscapes, suggesting new ways to produce, consume and waste, to engage with resources, to use ours or others’

<sup>5</sup> The Ellen MacArthur Foundation (henceforth EMF), an influential think tank that promotes circularity, defines a circular city as one that strives “to eliminate the concept of waste, [and] keep assets at their highest value at all times,” assisted by digital technologies (Ellen MacArthur Foundation, 2017: 7). This is the working definition we use for this article.



labour, or to interact with technology and with the more-than-human world (Caprotti and Kaika 2008).

In the Netherlands, a country that declares itself a “pioneer” of circularity, a growing number of parks, plazas, and street corners are now hosting new circular infrastructures. Amsterdam was among the first cities to commission research into practical ways to transition to a circular economy.<sup>6</sup> It identified three value chains that needed to be prioritized to help the city make the transition to a fully circular economy by 2050: construction, biomass and food, and consumer goods (Gemeente Amsterdam et al., 2019).

We are going to share more with each other, reuse more and repair more, which will also lead to less degeneration in the city – a tidy city is a safe city... Developing a circular economy, we will ensure: a fairer society, a resilient society, a healthier world, a more efficient economy. (Gemeente Amsterdam, 2020: 10, 20)

Right from the beginning, design played a central role in creating the city’s transition pathways, since waste is considered a “design flaw” that can be “designed out” by (“more efficient”) product, industrial, and system designers (Ellen MacArthur Foundation, 2013a; Medkova and Fifield, 2016; Savini, 2019, 2021). In this logic, spatial planners, urban designers, architects, and engineers have important roles to play in the production of the circular city. According to the EMF (2017: online): “Infrastructure, vehicles, buildings, and products [should be] designed to be a combination of durable, adaptable, modular, and easy to maintain and repurpose.” Amsterdam’s circular plan makes this explicit: “The task of maintaining and modernizing the existing infrastructure of roads and streets, bridges and canal banks, and cables and pipes is likewise enormous and achieving circularity is extremely important” (Gemeente Amsterdam, 2020: 65).

So, in line with its circular vision, Amsterdam City Council started to commission a large number of new circular infrastructures. These were shrines that would embody and showcase the city’s circular dream:

The main task for designers is the integration of such iconic objects in the urban fabric. Like windmills, heat hubs and installations for soil purification, the [water] towers contribute to the identity of the circular city... so its primary

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6 Notably, the circular economy was an object of policy and research in China in the early 2000s, more than a decade before it started gaining popularity in Europe and elsewhere (with the 2013 EMF report). China has adopted circularity to address pollution (associated with rapid, urbanizing growth), whereas in Europe interest is more focused on business opportunities and resource use efficiency (McDowall et al., 2017).

contribution is towards visual quality. It is a challenge to make the dynamic functioning of the water system visible by showing the content of the buffer... there are [also ways to] utilise the towers for recreational purposes as a climbing wall or vantage point. (DELVA Architects et al., 2016: 84)

The rhetoric about the importance of the design and visibility of these new infrastructures is reminiscent of what Kaika and Swyngedouw (2000) and Kaika (2005) argue: that technological networks constructed from the mid-19th through the 20th century were deliberately designed to be prominently visible in the landscape and in the everyday lives of urban denizens. Waterworks designed as ancient temples and sewage plants designed as cathedrals ensured that the urban population was made highly aware of the transition to a modern sanitized city that these metabolic conduits and networks brought.

The emergence of new circular technological networks do something similar. They account for a re-emergence of the idea and practice of carefully designed, visible, even tangible and haptically inviting, urban shrines that show the path towards a new, circular relationship between urban denizens, nature and the city.

But it is not only traditional urban infrastructures of water storage, water circulation, sewage and waste disposal that became redesigned as the new shrines of circularity. Recently, 200 brand new iconically designed “worm hotels” were scattered around the city animating a new vision where 200,000 worms labour together with the organic waste of neighboring humans to deliver a circular dream of local composting (see Figure 2).

Also in Amsterdam, new public composting urinals in the form of flowerpots, force synergies between (‘male’) public urine disposal and plant growth (see Figure 3). The GreenPee urinals are designed to visually and metabolically draw passersby into the socioecological imaginary of a circular city:

The GreenPee is not only beautiful and functional, but also sustainable. The GreenPee does not need to be connected to the water or sewage system, which means less pollution for the environment. In addition, the GreenPee contributes to a circular economy. The GreenPee collects urine in a container that is filled with odor absorbing hemp fibers. After composting, this fiber-urine-mixture becomes a phosphate-rich organic fertilizer. This fertilizer can be used to fertilize parks and green areas in a natural way (GreenPee, 2020: online).

Peeing in Amsterdam now becomes a means to actively participate in the city’s dream for circularity. These GreenPee urinals accompany Amsterdam’s



**Figure 2: A worm hotel in Amsterdam West. Source: Author**





**Figure 3: GreenPee urinals installed around Amsterdam's Rembrandtplein. Source: Author**

existing public restrooms, which were previously redesigned from closed private tubes to open spirals (*krul*); a violent means to ‘design-out’ homosexual public sex and ‘addict’ drug use in a profit-driven heterosexualization of space that included the re-ordering of gendered practices. The redesign of public restrooms eliminated ‘female’ urination from the city. The cylindrical private restrooms, originally designed for men and women, closed their doors to public access. They became hermetically sealed objects which are now repurposed: either as ‘green’ silos featuring grass and flowers on their rooftop and periphery; or as cylindrical advertising billboards featuring several layers of flyers wheat-pasted on their surface.

In the same city, new purpose-built infrastructures for rainwater collection weave together the city’s weather with the city’s beer brewing history and its growing microbrewery economy (see Dijk et al., 2018) in the making of a new type of beer: circular beer. Recent road repair works in Amsterdam use “circular cement” produced through “urban mining” that salvages and reuses materials from demolished buildings with the help of “innovative” logistics networks (Van Buren et al., 2016).

Although the key focus of academic research on circularity is often on the importance of information and communication technology (ICT), geosocial mapping, big data, and digital platforms for turning “waste to value,”<sup>7</sup> circular flows are not only harboured by smart technologies, computers, fibreoptic cables, satellites, and server farms. Transforming the waste(d) spaces, or wastescapes, of (linear) extended urbanization into circular city paradigms is pursued through concrete material infrastructures, living laboratories and circularity incubators that enact a new form of urbanity (Amenta and van Timmeren, 2018; Amenta et al., 2019; Remøy et al., 2019).<sup>8</sup> Amsterdam’s De Ceuvel and the Green House in Utrecht are prime examples of this type of infrastructure that brings together entrepreneurs, businesses, designers, governments, and the public in the service of circular futures. De Ceuvel, an incubator built on heavily polluted ground is described as “a city playground for innovation, experimentation and creativity where we aim to make sustainability tangible, accessible and fun”<sup>9</sup> (see Figure 4). “In this mix the architectural form... becomes a totemic figure in attracting interest and confidence in the experiment and accelerating its development”

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7 For instance, the REPAiR (Resource Management in Peri-Urban Areas) project’s open source “geo-design spatial mapping tool” helps local and regional authorities “turn waste into value” through compiling, manipulating, and (re)presenting “visual and accessible” spatial data on material flows (Arciniegas et al., 2016). (Sadahiro, 2008; Bocconi et al., 2015; Pagoropoulos et al., 2017; Shelton, 2017; Karjalainen et al., 2019; Savini, 2019; Jochum, 2020).

8 On extended urbanization see Keil (2018).

9 De Ceuvel “Welcome to De Ceuvel” [WWW Document] URL <https://deceuvel.nl> (accessed 31st March 2021).



**Figure 4: A selection of local beers on display and for sale at De Ceuvel's cafe. Source: Author**

(Ortner, 2020: 15).<sup>10</sup> In Amsterdam's Zuidas area, another flashy circular building, the Circl pavilion funded by the ABN-AMRO bank also builds promises for "new connections, new solutions, new values. Change means guaranteeing tomorrow by acting today. We're on our way. We have a dream!"<sup>11</sup> A few kilometers away, in the nearby city of Rotterdam, another large-scale circularity experiment is showcased at BlueCity, a model circular city within the city, hosted inside the once iconic Tropicana complex, purpose-built in 1988 as a 'subtropical swimming paradise.'

We argue that these new circular buildings, infrastructures and artefacts are important for creating a path towards socio-environmental change; they tell new stories about alternative futures, they re-teach citizens how they move, consume, live in cities, how they can imagine new forms of urbanity (Kaika and

<sup>10</sup> Caprotti (2019: 2466) argues that 'smart city' buildings and spaces are constructed to make the 'smart city' visible, they also exist as "banal, serialised, totemic approaches to contemporary urbanisation."

<sup>11</sup> Circl "The Making of Circl", September 2017 [WWW Document] URL <https://circl.nl/themakingof/en/> (accessed 31st March 2021).

Swyngedouw, 2000; Kaika, 2010). As Latimer and Skeggs (2011: 393) point out, “imagination [is] one of the key sites in which political and cultural agendas... are played out.” And the spokesperson for BlueCity’s “circular playground” confirms: “What we do in BlueCity speaks to the people’s imagination.”<sup>12</sup>

These contemporary architectural forms are reminiscent of the 19th century arcades, winter gardens, panoramas, factories, wax museums, casinos, and railroad stations that Walter Benjamin (1999) described as “dream houses of the collective.”<sup>13</sup> Like the 19th century arcades, the new circular infrastructures support new ways of dreaming urban futures. They are the “urban dowry” (Kaika and Swyngedouw 2000: 121) for a post-growth city, designed and deliberately installed to be prominently visible and increasingly ubiquitous in urban space as a means to spread the message and the dream of a circular post-growth city in-the-making. The BlueCity spokesperson offers a description that is uncannily similar to how Benjamin described the 19th century Parisian arcades: “In some ways we are a shop window displaying what a circular economy could look like. Circularity is a complicated concept, but in BlueCity it becomes touchable and solid.”<sup>14</sup>

The public discourse, rhetoric and iconography surrounding these brand-new circular infrastructures confirms their role as wish-images for a potentially better circular economy and society. It is worth noting that many of the infrastructures discussed above may not be of the same scale, or at first appear to have the same performative impact, as the monumental constructions of the 19th and early 20th centuries. In part this expresses a transformation of planning practice in the 21st century from comprehensive planning to what urban planner Jamie Lerner (2016) calls “urban acupuncture.” Lerner argues that these serial, more localized interventions can serve as “sparks” that set off “currents” that spread. Therefore, even smaller interventions should not be overlooked, particularly because of their connection to planning practices and visions, like ecomodernization and circularity, that are anything but humble. In line with Mould’s (2019: 469, 480) exploration of urban benches, we argue that all manner of urban artefacts can enforce “a particular kind of urbanisation; one that emanates from the collective

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12 Nazaruk, Z. “Take a Tour Around BlueCity, Rotterdam’s Centre of Circular Experiments”, DutchNews.NL, 17 August 2020 [WWW Document] URL <https://www.dutchnews.nl/features/2020/08/take-a-tour-around-bluecity-rotterdams-centre-of-circular-experiments/> (Accessed 31 March 2021).

13 Just as Benjamin considered the arcades to express modernity’s pre-history, we might think of these circular laboratories, incubators, and playgrounds as sedimenting a pre-history of circularity.

14 Nazaruk, Z. “Take a Tour Around BlueCity, Rotterdam’s Centre of Circular Experiments”, DutchNews.NL, 17 August 2020 [WWW Document] URL <https://www.dutchnews.nl/features/2020/08/take-a-tour-around-bluecity-rotterdams-centre-of-circular-experiments/> (Accessed 31 March 2021).



and institutional will of the designers and commissioners... Therefore objects have a great deal of political agency in the urban process... they can direct emancipatory and critical creative actions just as much as they can direct us to behave in particular technocratic ways within the city.” Indeed, the materialities of the circular infrastructures we have highlighted, large and small, are designed to have a productive and seductive force on human subjectivity so that, stitched together, they form a “dense scaffolding of things that enables and shapes human thought” (Ash and Simpson, 2016: 64) and action.

As circular economies and circular cities are fast “becoming the new normal” when it comes to planning for “sustainable” futures, (PriceWaterhouseCoopers, 2019), a more critical examination of how the production of new, explicitly circular, infrastructures, artefacts, and commodities are enrolled in projects of changing social, economic, and environmental values becomes imperative. In order to explore this in more depth, the sections that follow use as a vehicle the production, circulation, consumption, recycling and waste of beer in Amsterdam. We juxtapose the production of new types of sustainable and circular beer in Amsterdam, to the historical production of the same product in the same city, and examine the extent to which new flows of discourses, resources, labour, capital, infrastructures and waste related to the production of circular beer signifies a potential for a transformative socio-environmental impact.

## **Brewing the way from modernity to circularity: food and drink at the center of urban imaginaries**

As noted in the introduction, our fieldwork unexpectedly came upon the mobilization of beer production by the Dutch state, municipality of Amsterdam, business and thinktanks as a prime example of the potential for a circular transition in two ways: first, as an industry and biomass stream conducive to circular reorganization that would eliminate waste; second, as a popular commodity that can generate citizen-consumer awareness and desire for new circular transitions and ways of life. Indeed, the beer industry in the Netherlands has become one of the “pioneers” of circularity. And Amsterdam leads the way.

“What does the circular economy look like for beer?” This was the titular question of a key presentation at the 2019 EMF Summit, an event intending to “bring the circular economy to life.”<sup>15</sup> Whether subsistent, luxurious, or anything

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15 The importance of a shared vision for a ‘sustainable transition’ has been widely noted in both the academic and business literature (Ferreira, 2017; Frantzeskaki et al., 2017; Nußholz, 2018; Feola and Jaworska, 2019; Rana et al., 2020).

in between, the production and consumption of food and drink have always been actively involved in the metabolic making of bodies and urbanities (Atkins et al., 2007). In *Constructive Drinking*, Mary Douglas (1987) edited a collection of anthropological accounts about how drinks and drinking – especially alcohol – contribute to constructing the “world as it is” but also to constructing “an ideal world.” More recently, Kaika (2005), Gandy (2014), and Swyngedouw (2015) traced the production of water during early and late modernity through the historical spatialities and materialities of technologies, networks, labour and capital investment, helping us understand water not as a ‘thing’ but as a process composed of various flows (see Harvey, 1996; Swyngedouw, 2004). Kaika (2005) argues that the infrastructures and architectures of water became prominent material expressions of progress; they “visualized the ideology of emancipation through progress in everyday urban experience”; they became evidence that a better world was already in-the-making.

The production of beer has equally been central in shifting notions of modernity, nature, health, morality, and pleasure, that can be traced through shifting flows of barley, hops, laborers, yeast, drinkers, urine, money, glass, aluminium, etc. Beer is the third most commonly consumed beverage in the world, and has played culturally, economically, and politically important roles in the history of Amsterdam and the Netherlands (see Unger, 2001, 2005). Like water, the infrastructures and architectures of beer production became prominent material expressions of progress during the late 19th century, as the stagnating brewing economy was spurred into industrial production with promises of modernization visualized in the 19th century’s monumental industrial breweries.

Geographers Latham and McCormack (2004: 714) suggest that paying attention to psychoactive substances, like alcohol, can help us think about the affective and material “elements of the urban” and “the forms of urbanity and sociality in which these are implicated.” Taking up their call, Lawhon (2013: 682) emphasizes the “conditional relationality” of alcohol, arguing that “some of the most important reasons to study alcohol are not because of its sociomaterial movements, but because of how alcohol shapes other sociomaterial hybrids and relations.” Unger (2001: 348) explains how G.J. Mulder, the 19th century professor of medicine at the University of Utrecht, pointed out that the shift from beer to genever (a Dutch spirit) consumption contributed to the exacerbation of malnutrition, and therefore the increase in sickness and weakening bodies for city dwellers in Holland. Mulder even claimed that the rise and fall of Dutch brewing coincided with the rise and fall of the Netherlands. Whether that is true or not, there is no doubt that beer brewing has long been at the heart of the Dutch economy, public and social interaction, and everyday life.

In 1869, when Amsterdam hosted its own World Fair in the purpose-built Paleis voor Volksvlijt (modelled after London's Crystal Palace), the then young brewery owner Geraard Heineken was inspired, later taking his new product, Heineken beer, to the World Fair in Paris in 1889 (Sluyterman and Bouwens, 2014; Smit, 2014). World Fairs became particularly interested in the increasing innovation in food and drinks production through industrial manufacturing across the world, and Heineken's beer had something innovative to show: its new type of "pure" yeast. Indeed, Heineken's "pure" yeast beer was awarded the Paris Expo's Grand Prix. The distinction is still inscribed on Heineken beer cans to this day. Heineken's great innovation was that for the first time, it developed and scientifically produced yeast and fermentation inside the laboratory of its brewery.<sup>16</sup> The lab-produced yeast was nature-free and hence pure. For the jury of the exhibition, Heineken's beer and brewing embodied the Promethean (or, in this case, Pasteurian) promises of modernity: a nature tamed to provide safe and "pure" types of intoxication to the growing urban masses, while at the same time helping expand capital accumulation.

By the early 20th century, the key driver for promoting industrial beer consumption was through the aestheticization or fashioning of bottled beer. In popular culture, advertisements, and promotional materials, drinking beer turned from a mundane act of intoxication, into something that could open up the space for (day)dreaming utopian dreams and new possibilities.<sup>17</sup> As new social visions and urban imaginaries emerged in the late 20th century, beer labelling and advertising followed them. During the late 20th century and in the beginning of the 21st century, beer brewing, and craft breweries in particular strongly embraced sustainable and post-industrial urban imaginaries (Mathews and Picton, 2014; O'Neill et al., 2014; Jordan, 2016). In the 2020s, beer drinking is strongly infused with sustainability discourses (Gatrell et al., 2018), with local consumption visions, and more recently, with circularity ideas. One can now get drunk while imagining a world that is more sustainable, more egalitarian, more local, while purchasing, ingesting, and metabolizing new experiences, desires, and discourses.

Recently, industrial and micro- breweries in Amsterdam and around the world, became key players in the materialization of urban circular dreams through

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16 "All the Pasteurian 'applications' were 'diffused,' as we say, only if it was previously possible to create in situ the conditions of a laboratory. The pasteurization of beer or milk, hermetically concealed containers, filters, vaccines, serums, diagnostic kits-all these served as proof, were demonstrative and efficacious, only in the laboratory. If these applications were to spread, the operating room, the hospital, the physician's office, the wine grower's winery, had to be endowed with a laboratory" (Latour, 1988: 90).

17 See Du Gay and Pryke, 2002; 6, 86; Klein, 1993: 52.

newspaper and magazine articles, advertising campaigns, but also in policy documents, industry publications, and academic research. In 2019, the *New York Times* section on Climate and Environment ran an article on how “A ‘Circular’ Food Economy Could Combat Climate Change,” focusing in particular on the spent grain from a brewery that goes to compost, and highlighting the importance of the ‘future of food’ as ‘local, shared, and recycled.’

The food and drink that were actively involved in the metabolic making of modern bodies and modern worlds since the late 19th century, now become centrally involved in the making of circular cities and circular consumption, production and disposal cultures, and everyday practices. The brewing industry is often used today as one of the most promising examples of the profitable circular potential for cascading organic waste streams and packaging redesign (Ellen MacArthur Foundation, 2013a, 2013b). Multinational breweries AB InBev and Heineken are members of the CE 100 forum working with EMF to advance the circular economy.<sup>18</sup> In the first issue of their “Beer in Europe” newsletter, the Brewers of Europe organization (2016) approvingly wrote:

“Teaming up to shape a beer-friendly, smart and prosperous EU business environment” - is the European Commission’s approach to the Circular Economy, which covers beer-specific aspects including water reuse, secondary raw materials, food waste and packaging waste. Companies and associations in the beer sector already see responsible brewing as natural. We now need to share our viewpoint more widely.

The sentiment is echoed by the association of Dutch brewers (Nederlandse Brouwers): “Closing cycles is second nature to brewers and the brewing sector and in this way makes a positive contribution to the creation of the circular economy, which is currently being pursued both nationally and internationally” (Nederlandse Brouwers, 2018).<sup>19</sup>

During a 2015 marketing campaign, Heineken partnered with augmented reality app producer Blippar to design an experience for smartphone-users interacting with a bottle of Heineken that “brought to life” the company’s Brewing a Better World sustainability initiative.<sup>20</sup> Through this technorganic engagement,

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18 CE 100 is a forum of leading global companies, governments, higher education institutions that collaborate on and network for the development of practices based on principles of circularity.

19 Original Dutch: “Het sluiten van kringlopen is voor brouwers een tweede natuur en hiermee levert de brouwsector een positieve bijdrage aan de totstandkoming van de circulaire economie waar op dit moment zowel nationaal als internationaal naar gestreefd wordt.”

20 Blippar “Blipp for a Better World: Heineken and Blippar Build Sustainability Campaign”, 5 May 2015 [WWW Document] URL <https://www.blippar.com/blog/2015/05/05/blipp-for-a-better-world-heineken-and-blippar-build-sustainability-campaign> (Accessed 31 March 2021).

the past, present, and future implode in a dream-like ‘augmented’ reality. The past is mythologically inscribed onto the beer’s current bottle label, a reminder of all the prizes and medals that the original recipe, allegedly still-in-use, had been awarded since the 19th century. Then, the beer label, the fossilized imprint of a colonial industrial modernizing past, transfigures on the smart phone screen into a dazzling animation promising a better, sustainable future. The drinker/user/spectator is acquainted with seven “eco-minded” hop and barley farmers who are presented as “Western Heroes,” aesthetically conjuring not sleek futuristic ecocities, but settler colonial imaginaries of the Wild Frontier.

In 2016, Heineken’s Groene Cirkels (Green Circles) partnership with Alterra Wageningen UR and the Province of South Holland claimed to “follow nature’s perfection” in redesigning a more perfect society (Heineken, 2015). In an English-language report, offering a mythological origin story, dreams of “the greenest beer in the world” intermingle with “dreams of a green and sustainable environment” (Heineken, 2015: 4). The circle articulates the critical juncture between dreaming and acting providing a normative, allegedly natural, framework that directs action towards furthering the circularity of material flows such that good and sustainable action is that which proliferates ‘circles.’ As Gregson et al. (2015: 224; see also Kirchherr et al., 2017; Adams, 2019) point out, the notion of a perfect circle becomes “taken for granted” and “an endlessly recited ideal.”

Heineken’s Groene Cirkels campaign was established just before the Netherlands began to embrace circularity. In 2016, the campaign was brought under the national program for transitioning to a circular economy (The Ministry of Infrastructure and, the Environment and the Ministry of, and Economic Affairs 2016) while in 2018 a glossy magazine campaign invited the world to “Join Holland’s Flow” (Holland Circular Hotspot 2018).

Today, craft microbreweries in the Netherlands have joined multinational industrial breweries in pursuing, or laying claim to, circularity. The aesthetic-political power of the linear versus circular opposition can subsume the innumerable forms of organizing unfathomably complex socioeconomic systems into a binary of universalist shape forms. Not only does this make a direct appeal to a certain common sense but undergirds the construction of deceptively simple and communicable imaginaries of the past, present, and future (see Berlant, 2016 on common sense and infrastructure).

# How new urban infrastructures make the circular city sensuous, visible and tasteable

The circularity campaigns launched by the third most consumed drink in the world are very important for forming the opinion of lay citizens and consumers for whom the economic or ecological ‘benefits’ of circularity may seem distant and abstract.<sup>21</sup> Making the circular economy sensuous, visible and tangible is important for bringing circularity to life, for building and sustaining the wish-image of a better world that a circular economy can create. One of the speakers at Summit 2019, a co-founder of UK start-up Toast Ale that brews beer with ‘surplus’ bread, emphasized that each beer-commodity is infused with the circular dream: “Every bottle carries with it, both within it and on the packaging, a message about food waste and what we need to do about it.”<sup>22</sup>

The metabolic circulation of beer is reconfigured to ‘beautify’ waste in two ways: to produce gustatorily beautiful beer out of bread waste-resources and to produce visually beautiful geospatial data mapping bread-beer waste-value flows (see Halpern, 2015 on ‘beautiful data’). This way, the city not only becomes a “stage for the visual valorisation of waste” (Savini 2019, 686) but a smorgasbord for the gustatory valorisation of waste. Circular beers make the circular city literally tasteable: “Brewing with waste streams results in peculiar and tasty combinations that have not gone unnoticed by beer lovers.”<sup>23</sup>

These recent changes in the production and metabolic circulation of beer – which claim to turn waste into value, bread into beer, and rainwater into gold – are very important for imprinting into the general public the ideal of circularity and a new way of managing urban infrastructures.

Like in most cities, the bulk of rain falling onto Amsterdam’s built environment turns into surface runoff and eventually into wastewater channeled into the city’s sewer system. In recent years, however, Amsterdam’s Rainproof project was tasked to maximize the “sponge effect” of the built environment and ideally prevent rainfall from flowing into the sewer system (Amsterdam Rainproof 2018). “Every drop counts!” is the project’s motto, which re-imagines rainwater

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21 While for policy makers, technocrats, and investors, visions of the future are only meaningful if progress towards that future can be measured (Linder et al., 2017; Circle Economy et al., 2018; Potting et al., 2018)—for example, through the achievement of ‘science-based targets for nature’ (Metabolic, 2019) or the closing of the ‘circularity gap’ (Circle Economy, 2018, 2019, 2020).

22 <https://www.youtube.com/watch?v=i5ESF-J7IaA>

23 Dijkhuizen, M. “‘It’s cool to see that products that normally end up in the bin, can be used to make tasty beers’—Interview with Ruben Krommenhoek from brewery Vet & Lazy”, BlueCity, 27 June 2019 [WWW document] URL <https://www.bluecity.nl/blog/circular-beer-brewery-vet-lazy> (accessed 18th August 2020).

as raw material and resource instead of waste and approaches rainproofing as an opportunity “to make the city more resilient, greener and more attractive” (see also Cousins, 2017; Amsterdam Rainproof and Naafs, 2018: 8). One of the fundamental challenges that the project encountered, however, is generating widespread public interest in collectively reimagining rainwater as a resource. Amsterdam Rainproof commissioned mediaLAB to address issues of public awareness and involvement through design. One of the results of this collaboration was Rainbeer:

‘In creating Rainbeer, we wanted to demonstrate the versatility of rainwater – we regard rainwater as the new gold. Our label tells the Rainproof story, and our payoff is ‘No rain. No beer.’<sup>24</sup> But our most important ambassadors have turned out to be bar personnel. The beer is a good conversation starter, a way for people to discuss a seemingly boring subject in a fun way.’ And it works: ‘People are taking an interest in rainwater all of a sudden.’ Rainbeer has won several innovation and sustainability awards and will soon be launching five new beer varieties across five cities (Amsterdam Rainproof and Naafs, 2018: 54).

While there is intention to eventually brew substantial volumes of rainbeer, the project’s main and immediate current aim is to generate to the general public interest and curiosity around circular futures, by mobilizing the everyday pleasures of beer intoxication.

Of course, channeling rainwater through catchment infrastructures and transformative boiling and fermentation vats, dispersing it volumetrically and geographically through kaleidoscopic circulations of bottles, cans, and kegs and finally delivering it into drinkers’ desirous bodies and metabolisms still likely leads into some waste system somewhere when it falls as urine. But even that can now be captured in the GreenPee planters, the city council’s circular public urinals and plant pots that promise to turn metabolised beer into something useful. This way, even peeing in Amsterdam’s streets means connecting to the city’s imaginary for an emerging circular society.

Beer – sometimes called ‘liquid courage’ or a ‘social lubricant’ – and the networked infrastructures and architectures of its production, circulation, and consumption are called upon to make grand and abstract circular dreams relatable and achievable, not only think-able but sensible, enticing... intoxicating.

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24 This has a certain resonance with the early 20th century slogan: No Beer, No Work! Used by trade-unionists in the United States in their opposition to Prohibition.



# From beer to urbanization and back: intoxicating dreams and nasty awakenings

Savini (2019: 676) argued that the circular economy “marks the beginning of the capitalist economy’s structural adaptation to problems of waste accumulation and resource scarcity” which depends on “a form of urban eco-entrepreneurialism, in which waste is beautified.” And indeed, the continuous circulation of biomass – organic waste streams – to produce new value is a key tenet of circularity. But in this article we argued that circularity as a transition narrative with staying power is sustained not only by smart technologies, biomass circulation, statistical analyses, efficiency indicators, and massive amounts of data, but also by the intertwined infrastructures and material expressions of its promises in the urban landscape and everyday life.

Circularity’s call for turning waste into both use value and exchange value – something that is desirable enough to be purchased – requires not only the cooperation between new actors to enact an “alternative salvage value regime” (Barba Lata and Duineveld, 2019) but also requires making visible the ‘invisible’ flows of resources, labour, capital and waste, that circulate underneath and beyond the city. It requires making visible the invisible connections between production, consumption and waste, those “hidden geographies of the familiar” (Kaika, 2004) that colonial modernity tried so hard to sever. High level investment is necessary “to realise the necessary infrastructure, for example in the form of a physical pipeline, but also virtual databases to map [these] material flows” (Kraaijenhagen, Van Oppen & Bocken 2016). Designers and planners are heavily enrolled in the “aesthetic crafting” and “performance necessary to produce value” from waste (Halpern, 2015: 5).<sup>25</sup>

Amsterdam’s mayor, speaking recently in light of COVID-19 on how “the world is experiencing a series of shocks and surprise impact,” portrays enacting a new circular relation to nature as an imaginative project—a “shift away from the idea of growth to ‘thriving.’”<sup>26</sup> However, the City Council’s (2020: 7) report makes clear that the shift from growing to thriving is no easy task:

We have to break old habits and we have to change the way we think and act. This may cause friction. We are asking the people of Amsterdam to take a

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25 See also Lansing (2011, 2012) on the coproduction of carbon’s value and materiality in the making of offset markets.

26 Boffey, D. “Amsterdam to Embrace ‘Doughnut’ Model to Mend Post-Coronavirus Economy”, *The Guardian*, 8 April 2020 [WWW Document] URL <https://www.theguardian.com/world/2020/apr/08/amsterdam-doughnut-model-mend-post-coronavirus-economy> (Accessed 31 March 2021).

different approach to food, to change their thinking about possessions and to make different choices, in their lives and in their work.

For all the phantasmagoria and iconic design of the new urban technologies that support the city's circular dreams, the material transformations and infrastructures that a transition to a circular economy demands can be unsettling, or even overwhelming—much as in the 19th century (Kaika, 2005: 35). The city council of Amsterdam (2020: 78) warned: “the ambition of a gas-free and climate-neutral city will involve an unprecedented intervention in the city, affecting all buildings and public spaces.” Furthermore,

Change is paradoxical... we continuously strive for it while being afraid of it at the same time. Transformation takes this one step further... It requires creativity and courage: the courage to pursue grand, abstract goals and the creativity to solve, by 2030, the challenges the world now faces (Digital Society School, 2020).

Everything currently seems to be up for grabs with respect to circularity transitions. As Halpern (2015: 5) notes, “Cities are also massive prototypes, not-yet-realized instantiations of futures that may or may not come to pass.” Thus far, the indications are that, despite the intoxicating rhetoric, the dream of circularity as a potential planning paradigm for a post-growth future remains within the same old growth model; growth is not decoupled from resource depletion. But resource depletion happens elsewhere, in other geographical areas, out of sight and out of mind. Thus, despite promising a better future society circularity sustains, or even reinvigorates colonial imaginaries and relations in which the city and nation-state are considered self-contained fortresses and interrelated nodes within global interflows of goods and services, while waste becomes an exciting new (commodity) frontier to be exploited through infrastructural expansion. Much as the processes of urbanization, industrialization, and modernization in 19th century Amsterdam were underpinned by the exploitation and appropriation of labor and nature in the colonies, the city's transition to circularity equally relies on (but successfully obscures), for instance, the extraction of coltan to produce information and communication technologies (Kaika, 2017).

Focusing on material waste recycling, circularity can contribute to further reifying social relations of production, waste disposal and recycling, if it continues to invisibilize as social waste, those animating recycling and waste disposal. Nonetheless, there are also radical socioecological imaginaries fruiting from the grassroots, including powerfully articulated visions of decolonial

futures by indigenous drug and alcohol harm reduction practices, philosophy, and organizations grounded in forcibly occupied lands and histories (Canadian Aboriginal AIDS Network and Interagency Coalition on AIDS and Development, 2019). Perhaps the question of addressing our compounding socio-environmental challenges is not so much what to do with and how to technologically valorize material waste but how to support and collectively value the alternative socioecological imaginaries and practices cultivated by communities long caste aside, invisibilized, as social waste.

Our purpose here was not to determine whether the infrastructures and commodities we discuss actually succeed in delivering the promised transformations of social, economic, and ecological relations and practices. Instead, our purpose is to understand how new infrastructures and commodities act as vehicles to materialize and embody discourses and visions of circularity and to unearth the socio-environmental imaginaries embedded in new urban visions. In this way, we argue that circular infrastructures and commodities are purposefully designed to bring about the circular transition not only by reorganizing material metabolic circulations of goods and services but also by reorganizing the urban denizens' desire for circular futures, by making abstract visions of a circular city more concrete and sensuously enticing. There is a certain 'cruel optimism' (Berlant 2011) to these new urban materialities in that while they promise an improved way of life, a new more socially and environmentally sustainable circular future, the circular imaginaries they are designed to express and embed obscure this future's reliance on the continuation of growth-oriented value creation and new frontiers of commodification – the same old processes that have long underpinned urban modernization projects and are at the heart of the social and environmental catastrophes we are facing. In this way, circular infrastructures and commodities are likely to impede the achievement of the very future they are designed to teach urban denizens to imagine by manufacturing consent for the reproduction of exploitative capitalist and colonial relations.

## References

### **Municipal, national, and supranational policy websites**

Amsterdam: <https://www.amsterdam.nl/bestuur-en-organisatie/volg-beleid/coalitieakkoord-uitvoeringsagenda/gezonde-duurzame-stad/msterdam-circulair-2020-2025/>

The Netherlands: <https://www.government.nl/topics/circular-economy>

European Commission: [https://ec.europa.eu/environment/topics/circular-economy\\_en](https://ec.europa.eu/environment/topics/circular-economy_en)

United Nations: <https://www.unido.org/our-focus-cross-cutting-services/circular-economy>

### **Collections and databases hosted by think tanks**

Ellen Macarthur Foundation: <https://ellenmacarthurfoundation.org/publications>

Circle Economy: <https://www.circle-economy.com/circular-economy/insights-publications>

Holland Circular Hotspot: <https://hollandcircularhotspot.nl/publications/>

Metabolic: <https://www.metabolic.nl/publications/>

### **Industry associations**

Brewers of Europe: <https://brewersofeurope.org/site/media-centre/>

Nederlandse Brouwers: <https://www.nederlandsebrouwers.nl/biersector/publicaties/>

### **Historical Archives**

Gementee Amsterdam Stadsarchief: <https://archieff.amsterdam/>

The Heineken Collection Foundation's online archive: <https://www.heinekencollection.com/en/collection>

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# Conclusion:

## Towards a politics of taste

This thesis has wound its way through a section of Amsterdam's beerscape, exploring some of the flows and infrastructures that compose it and practices of some brewers, maltsters, drinkers, squatters, and planners that animate and shape it. Through the metabolism and circulation of beer, I paid particular attention to the ways that the senses are mobilized in the making of economies, beerscapes, and socio-environmental imaginaries. I have examined the senses as not only consumptive but also as *productive* of commodities and urbanscapes. I explored multiple sensory practices including waged sensory labor, such as the tasting necessary to judge the quality of malts and beer, the unwaged sensory work of drinkers who upload their sensory experiences to beer rating apps, as well as the sensuousness of imaginaries, such as in the idea of being able to 'taste the city' and the marketing of sustainability infrastructures and visions of the future as gustatorily inviting. Through this ethnographic attention to the senses, I have shown how bodily natures are shaped, organized, and mobilized in relation to the socioecological processes of commodity circulation and urbanization. Bodies and sensoriums, however, are not simply observers and consumers passively enrolled into these processes, they are active participants in the production and contestation of sensuous environments. The senses are put to work and through that practical activity bodies and cities are co-transformed.

This dissertation has made three contributions to the field of urban political ecology. Empirically, the flow of beer adds a novel case study that brings into necessary conversation urban and agri-food studies. Methodologically, I have sought to further enrich the already heterodox field through cross-pollination with approaches from science and technology studies, autoethnography, and digital geographies. Theoretically, my focus on the senses offers a conceptualization of the sensorium as an important material and political site in the process of urbanization. Additionally, it offers a contribution to anthropology of the senses by examining the practicalities, as opposed to the meanings, of sensing and their role in the circulation of economic value.

## **Towards a Politics of Taste**

My interest in the senses was somewhat unexpected and, like many PhD students before me, in reflecting on the finished product I'm left with the feeling that this is not the dissertation I set out to write. This is hardly a surprise. Indeed, a common topic of discussion around the coffee machine in the Anthropology department is the excitement and confusion that comes with doing ethnographic fieldwork and the inevitability of being affected by the field. While there is much debate about the definition and methodology of ethnography, one commonly cited benefit of this open-ended approach to research is that through immersive interaction research questions are refined and transformed. At the first brewery I visited I asked questions about where their ingredients come from, how their supply chains are organized, and what had allowed them to become a successful brewery. I was surprised by the head brewer's answer: it all comes down to taste. More surprising, I quickly began to question what exactly the seemingly mundane act of tasting requires, means, and does. It is a cliché to say that ethnography seeks to make the familiar strange but over the course of my research taste became very strange indeed.

As this dissertation is article-based, each chapter has already come to its own conclusion. In this final section, then, my goal is not to sum them up into one over-arching conclusion but to highlight three cross-cutting themes – three ways in which taste became strange to me – that I feel are worthy of further scholarly attention.

### **Tasting as Knowing**

Tasting is a strange way of knowing. As I mention in Chapter 4, taste has often been relegated to the bottom of various philosophers' attempts to hierarchize the senses. The so-called 'higher' senses, or what Hegel describes as the 'theoretical' senses, of sight and hearing have long and often been privileged and associated with mind, knowledge, and morality. Their distinction from the so-called 'lower' senses of taste and touch, associated with body, pleasure, and enjoyment, relies on the apparent distance between subject and object, likewise mind and body. Indeed, tasting foods and drinks is, at least ideally, about pleasure and satisfaction. However, during the sensory evaluation training that I participated in, I learned that tasting beer can also be about something other than simply enjoying it. Tasting, I came to understand, can be a way of knowing about a beer, about its chemical composition, the ingredients, the yeast that fermented it, the process of brewing, and the place where it comes from. Tasting a beer, then, can be an intimate way of knowing and connecting to the world. This is not an innocent or apolitical



endeavor. Investigating different practices of knowing is one way to unravel the making and circulation of values – both cultural and economic. Paying attention to the ‘lower’ sense of taste may be a strategy for shifting analytical attention to the knowledges, realities, and possibilities of the periphery, perhaps akin to a shift towards the knowledges, realities, and possibilities of spatial peripheries argued for in Chapter 1.

Political-ecological projects of ‘good taste’ are ostensibly about knowing and cultivating better social and ecological relations in agri-food networks (Hayes-Conroy and Hayes-Conroy 2008). They generally focus on education that shifts consumer values and practices. Marx (1976, 290) may have quipped that “the taste of porridge does not tell us who grew the oats,” but Spackman and Lahne (2019, 144) note that smell and taste are commonly used to judge the ethics and merits of different food networks. In Amsterdam, as I discuss in Chapter 4, squatters contested the industrial mass production of beer by developing new tastes – both in the form of preferences and material qualities. Similarly, in Chapter 5, I show how citizen-consumers are encouraged to know that a better world is possible by tasting beer brewed with rainwater and bread waste. Importantly, tasting is not only a practice through which consumers might come to know what is good and establish what is valuable. In agri-food systems the tasting practices of various experts and workers are also involved in the production of knowledge that contributes to the organization of socioecological networks and the circulation of commodities. For scholars interested in the production of knowledge, tasting practices offer a potentially fruitful avenue of research into embodied ways of knowing.

## **Tasting as Laboring**

Tasting is a strange way of laboring. With the geographically uneven development of capitalist modes of manufacturing and industry came spatial, temporal, and social divisions between manual and mental labor as well as between activities of production and consumption. Labor, it often seems, is meant to be done by either disembodied minds or mindless hands, while mouths and noses belong to pleasure-seeking consumers. Yet, in the breweries I visited, discussed in Chapters 3 and 4, all the senses are put to work, especially taste. Likewise, Heather Paxson (2012) has highlighted the ‘synesthetic reason’ of artisanal cheesemakers. Participants in and scholars studying craft and artisanal economies often distinguish them from industrial production based on a greater commitment to sensory knowledge and pleasure, to quality over quantity. However, what Spackman and Lahne describe as ‘sensory labor’ – in which “perceiving the tastes of foodstuffs both requires work and produces value” (2019, 143) – permeates all manner of agri-

food, as well as cosmetic and other, economies. This kind of labor is not confined to skilled artisans as the development and proliferation of sensory evaluation technoscience, described in Chapter 4, was fundamental to the industrialization of agri-food systems. In other words, studying taste labor helps reveal how the production and marketing of craft commodities “is imbricated in various ways in global industrial production processes, including standardized technoscientific testing” (Heath and Meneley 2007, 594). As Pickstone (2000, 13) points out, and I show in Chapter 3, knowing and doing are interrelated and ‘ways of making knowledge’ can also be ‘ways of making commodities.’ Throughout this dissertation I have sought to show that ‘taste is a moment in the circulation of capital’ (Michalski 2015). Tasting happens throughout the metabolic circulation of beer and “sustained examination of sensing... demonstrates that the types and modes of sensory labor mobilized in the provisioning, making, and eating of food are not neutral – rather they coproduce modes of food production” (Spackman and Lahne 2019, 144). For scholars interested in labor, studying sensory labor can help unravel production and consumption as internally related moments in a single process (as Marx argues in the *Grundrisse*; see also Heath and Meneley 2007).

## **Tasting as Imagining**

Tasting is strange way of imagining. The imagination, after all, is commonly located in the mind and perhaps the eyes (as in envisioning). Taste, on the other hand, has been cast as the ‘lowest’ and most ‘animal’ of bodily senses. When taste is not relegated to an (imagined) ahistorical nature but considered a manifestation of culture, as in the work of Pierre Bourdieu, it can still appear to be the providence of relatively mindless consumers almost helplessly enacting their learned habitus. The sensory desires of consumers have long been the target of marketers and advertisers, who have sought “to imbue their products with exactly the right look, feel and taste to appeal to (and manipulate) the consumer’s sensory imagination” (Classen 1997, 410). The production of these material qualities takes work, as I show in Chapter 3 and, as Chapter 5 argues, a similar dynamic is at play in the production of infrastructures and commodities designed to stimulate the sensuous desires of urban denizens and enroll them into – manufacture their consent for – new socio-environmental imaginaries. As Latimer and Skeggs (2011, 393) point out, “imagination [is] one of the key sites in which political and cultural agendas... are played out.” For collective imaginaries to take hold they must be materialized. In infrastructures, spatial forms and practices, and commodities, imaginaries are made sensuous and embedded into everyday life. For scholars interested in imaginaries, tasting offers a way to study how bodies are enrolled

into the production and embedding of imaginaries into everyday life and how imaginaries, in turn, become embodied.

Ultimately, I echo anthropologist and philosopher François Laplantine's (2015, 83) insistence that "a major part of social life consists of loving, suffering, tasting together... The political and the sensible can no longer then be considered in a binary and obsidional manner." In the context of the COVID-19 pandemic, in which millions of people have lost their senses of taste and smell (at least temporarily), it seems more prescient than ever to appreciate and research these often undervalued and understudied senses.

## Limitations

Finally, it is also worth mentioning some of the limitations of this work. Foremost, for a dissertation concerned with the co-production of bodies and cities, there is lack of explicit discussion about differently gendered, raced, and abled bodies. As many scholars, and indeed many of my interlocutors, note, the world of beer brewers, enthusiasts, and researchers in Europe and North America is overwhelmingly white, male, and middle-class (Chapman et al. 2017; Ocejo 2017). Amsterdam and the composition of my interviewees are no exception.<sup>1</sup> In part, this is expressed by the fact that although working in the Netherlands all my interviews were conducted in English with fluent English-speakers. A second limitation is a lack of attention to the policies and regulations that shape the flow of beer (with the exception of the historical narrative in Chapter 2). As Lawhon (2013) has shown, such considerations can reveal the frictions of alcohol circulation, disrupting the emphasis in much urban political ecology research on

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<sup>1</sup> There is one women-run craft brewery in Amsterdam, *Gebrouwen door Vrouwen*, however they politely refused my research request due to already being unable to keep up with press inquiries and consumer demand for their beers. As a queer femme-presenting person I often felt somewhat awkward and out of place in the breweries I visited. At times, my visible gender and sexual deviance seemed to surprise my interviewees when I showed up, many of whom felt the need to emphasize that they are concerned with the lack of women in the beer world. Yet, as a white person I also blended right in, and few interviewees felt the need to express a deep concern about racial diversity. To my amusement, I also surprised some visiting scholars that I had been in email contact with who, upon arrival, told me they were expecting a masculine frat guy. We laughed about it and I took them to a gay bar for drinks afterwards where, again to their surprise, I opted for a cocktail. In a similar vein, at many workshops and conferences there was an assumption that I would be working with queer theory. At one guest lecture, to my befuddlement, I was even introduced as a scholar working on a queer analysis of craft beer. Hilary Angelo and Kian Goh (2020) have written beautifully about the personal and theoretical tensions of being different in academic circles, similar to my own, sometimes critiqued for their homogeneity.

flow. Policy, standards, and certifications are also the focus of much agri-food research on the ‘quality turn’ and the organization of craft, organic, and artisanal food networks. Some of these limitations have to do with the format of an article-based dissertation and the requirements of the journals I submitted to. Unlike with a manuscript (or to a certain extent cultural anthropology journals) there is less space for an author to mention and reflect on aspects of their research and field that might be seen by editors and reviewers as tangential to an article’s line of argumentation. This is not to say I am unaccountable for these limitations, I made consequential choices, like every scholar does, about what to center, foreground, background, and leave out.

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## Summary

This dissertation examines the metabolic circulation of beer in Amsterdam by tracing it through histories, geographies, and practices of production and consumption. By following the flow of beer through time and space, I explore how bodies, commodities, and cities are made and remade sensuously, unevenly, together. The key objective is to reveal the active role that the senses and sensory activity, in particular the understudied sense of taste, play in the socioecological metabolic process called urbanization. Through this investigation into the activity of the senses in the production of commodities, urbanscapes, and imaginaries, this dissertation offers a significant contribution to the field of urban political ecology.

Chapter 1 provides an elaborate review of the urban political ecology literature, discussing some of the main contemporary debates in the field: the thesis of planetary urbanization, calls for a situated urban political ecology, the rift between politics and policy in urban studies, and considerations of the more-than-human. This co-written chapter, which emerged from a workshop held at the University of Amsterdam, speaks specifically to scholars working in and around urban political ecology and explores these theoretical debates without reference to beer or Amsterdam. Our purpose was twofold: (1) to emphasize and encourage the rich theoretical and methodological heterodoxy of urban political ecology and (2) to propose one possibility for an integrated, but not theoretically or methodologically homogenized, research agenda around peripheral, extended, and sub-urbanization.

Chapter 2 lays out a history of the shifting political ecologies of beer circulation and their connection with the urbanization of Amsterdam and the Netherlands. I trace the history of Dutch brewing from monasteries in the Middle Ages, through its commercialization in the early modern period, industrialization in the 19th and 20th centuries, and into the emergence and proliferation of micro and craft brewing in the late 20th and early 21st centuries. The intention of this chapter is to provide historical context and demonstrate the profound entanglements between shifting modes and techniques of beer production, political systems and regimes of taxation, unfolding rural-urban and inter-urban relations, class and colonial dynamics, changing consumer tastes and moral values, and ecological transformations. Additionally, this chapter highlights the significant but often unrecognized role that beer brewing, trade, and drinking has played in the formation of the Dutch state, Amsterdam's rise as an urban metropole and colonial power, and everyday life in the Netherlands.



Chapter 3 examines the art and science – or craft – of producing quality malts and beer. Discourses about quality have been central to the emergence of craft beer in terms of market segmentation, community formation, and brewer motivations and values. But what is quality and how is it achieved? More than simply a question of definitions, different ways of understanding, ensuring, and communicating quality shape production processes and articulate supply chains. I examine how multiple versions of good quality are enacted in a craft malthouse (located in the rural southern Netherlands) and brewery (located in Amsterdam) through the interplay of both instrumental (quantitative) and sensory (qualitative) practices that materialize particular qualities, or properties, of materials. I locate these practices within the history of brewing science and technology, which has transformed how the quality of beer is understood and known. The promise of modern brewing, made possible by the creation of the scientific brewer and manifested in the industrial brewery, was to tame the uncertainty of nature and assure objectively good quality beer through calculations and measurement. I suggest, however, that neither instruments nor sensations offer more objective evaluations and that different enactments of quality are instead about navigating overlapping uncertainties.

Chapter 4 explores how taste has contributed to transforming Amsterdam's urbanscape, specifically what I describe as its beerscape. This chapter questions the notion of taste as passive perception relegated to the domain of consumption, such as in invitations to 'taste the city'. If one can indeed taste the city, how does the city come to taste the way it does? I present three cases in which taste is productive of, in turn, space, value, and data. First, the historical role of taste in catalyzing Amsterdam's craft beer scene, especially through the co-production of new tastes and squatter spaces in the 1980s. Second, the (wage) labor of taste in breweries that produces value and mediates the metabolic circulation of beer. Third, the sharing of taste and production of data on a geosocial beer rating app, Untappd, that permeates the mediatized Amsterdam beerscape. The three empirical sections of this chapter bring together interviews with brewers, beer sommeliers, and sensory evaluation specialists, ethnographic research at breweries, and autoethnography of sensory evaluation training and using the Untappd app. In arguing that taste is productive, I raise the question of cultivating 'good taste' as a political-ecological project. In showing how taste actively takes part in the production of space, value, and data, an interconnecting but contradictory dynamic emerges: a dialectic of taste equalization and differentiation.

Chapter 5 uses the production, circulation, consumption, recycling, and waste of beer as a vehicle to consider how commodities and infrastructures materialize imaginaries of sustainable, circular futures by casting them as sensuously inviting

and creating pathways to socioecological change. In addition to being considered a world capital of beer and brewing, Amsterdam has ambitions to become a capital of sustainability by recreating itself as a circular city. Circularity is a rapidly proliferating set of discourses and practices that aim, or at least claim, to reorganize production-consumption and society-nature relations. There are striking parallels to how the promises of modernity at the turn of the 20th century were embedded into and expressed by the production and display of new commodities and infrastructures. Considering the failures of modernization to deliver the just societies and tamed ecologies imagined by planners, architects, and designers, amongst others, it seems prescient to critically examine the emerging imaginaries and urban planning paradigm of circularity. Through an analysis of policy documents, civil society organization and business publications, newspaper and magazine articles, and urban architectures, infrastructures, and artefacts, we show that recent changes in the production and metabolic circulation of beer are important for imprinting into the general public the ideal of circularity and a new way of managing urban infrastructures. We argue that beer and the networked infrastructures and architectures of its production, circulation, and consumption are called upon to make grand and abstract circular dreams relatable and achievable, not only think-able but sensible, enticing, and intoxicating.

Finally, in the Conclusion, I highlight three cross-cutting themes that I feel are worthy of further scholarly attention: tasting as knowing, tasting as laboring, and tasting as imagining. For scholars interested in the production of knowledge, tasting practices offer a potentially fruitful avenue of research into embodied ways of knowing. For scholars interested in labor, studying sensory labor can help unravel production and consumption as internally related moments in a single process. For scholars interested in imaginaries, tasting offers a way to study how bodies are enrolled into the production and embedding of imaginaries into everyday life and how imaginaries, in turn, become embodied.

# Samenvatting

Dit proefschrift onderzoekt de metabolische circulatie van bier in Amsterdam door de verschillende geschiedenissen, ruimtelijke configuraties en praktijken van productie en consumptie van bier te traceren. Door de stroom van bier door tijd en ruimte te volgen, onderzoek ik hoe lichamen, goederen en steden worden gemaakt en steeds weer opnieuw gemaakt, op zintuiglijke en ongelijkmatige manieren. Het belangrijkste doel is om te laten zien welke actieve rol de zintuigen en zintuiglijke activiteit – in het bijzonder de maar weinig bestudeerde smaakzin – spelen in het socio-ecologische, metabolische proces dat verstedelijking wordt genoemd. Met dit onderzoek naar de actieve rol van de zintuigen bij de productie van goederen, stedelijke landschappen (urbanscapes) en verbeeldingen (imaginaries) levert dit proefschrift een belangrijke bijdrage aan het veld van de stedelijke politieke ecologie (urban political ecology).

Hoofdstuk 1 biedt een uitgebreid overzicht van de literatuur in de stedelijke politieke ecologie. In dit overzicht wordt een aantal belangrijke hedendaagse debatten uit het vakgebied besproken, namelijk het idee van planetaire verstedelijking, oproepen tot een gesitueerde stedelijke politieke ecologie, de kloof tussen politiek en beleid in stadsstudies (urban studies), en aandacht voor het meer-dan-menselijke. Dit hoofdstuk, dat ik met andere auteurs heb geschreven, vindt zijn oorsprong in een workshop aan de Universiteit van Amsterdam. Het richt zich op wetenschappers die zich bezighouden met stedelijke politieke ecologie en verkent de genoemde theoretische debatten zonder specifieke verwijzing naar bier of Amsterdam. Ons doel was tweeledig. Aan de ene kant wilden we de rijke theoretische en methodologische heterodoxie van stedelijke politieke ecologie benadrukken en aanmoedigen, en aan de andere kant een voorstel doen voor een geïntegreerde, maar niet theoretisch of methodologisch homogene, onderzoeksagenda op het gebied van perifere en uitgebreide verstedelijking en suburbanisatie.

Hoofdstuk 2 schetst een geschiedenis van de circulatie van bier, haar verschuivende politieke ecologieën en het verband van deze ecologieën met de verstedelijking van Amsterdam en Nederland. Ik start deze Nederlandse brouwgeschiedenis bij middeleeuwse kloosters om via de commercialisering van het brouwen in de vroegmoderne tijd en de industrialisatie in de negentiende en twintigste eeuw uit te komen bij het ontstaan en de snelle opkomst van microbrouwerijen en ambachtelijke brouwerijen (craft breweries) in de late twintigste en vroege 21ste eeuw. De bedoeling van dit hoofdstuk is om een historische context te bieden en de diepgaande verstrengelingen te laten zien

van veranderende manieren en technieken van de productie van bier, politieke systemen en belastingregimes, zich ontvouwende relaties tussen stad en platteland en tussen steden onderling, dynamieken rond klasse en koloniale verhoudingen, veranderende smaak en morele waarden van consumenten, en ecologische transformaties. Daarnaast belicht dit hoofdstuk de belangrijke maar vaak niet-erkende rol die bierbrouwen en de handel en consumptie van bier hebben gespeeld bij de vorming van de Nederlandse staat, de opkomst van Amsterdam als stedelijke metropool en koloniale macht, en het dagelijks leven in Nederland.

Hoofdstuk 3 onderzoekt de kunst en wetenschap – of het ambacht – van het produceren van kwaliteitsmout en -bier. Vertogen over kwaliteit stonden centraal in de opkomst van ambachtelijk bier (craft beer) wat betreft marktsegmentatie, gemeenschapsvorming en de motivatie en waarden van brouwers. Maar, wat is kwaliteit en hoe wordt die bereikt? Dit is meer dan slechts een kwestie van definities; verschillende manieren om kwaliteit te begrijpen, waarborgen en communiceren geven vorm aan productieprocessen en stippelen toeleveringsketens uit. Ik onderzoek hoe meerdere versies van goede kwaliteit worden opgevoerd (enacted) in een ambachtelijke mouterij (gelegen in een ruraal deel van Zuid-Nederland) en brouwerij (gevestigd in Amsterdam) door het samenspel van zowel instrumentele (kwantitatieve) als zintuiglijke (kwalitatieve) praktijken die bepaalde kwaliteiten of eigenschappen van materialen materialiseren. Ik plaats deze praktijken in de geschiedenis van de brouwwetenschap en -technologie, die heeft veranderd hoe de kwaliteit van bier wordt begrepen en gekend. De belofte van modern brouwen, die mogelijk werd gemaakt door de creatie van de wetenschappelijke brouwer en haar uitdrukking vond in de industriële brouwerij, was om de onzekerheid van de natuur te temmen en de productie van objectief goed kwaliteitsbier te garanderen. Ik suggereer echter dat instrumenten noch sensaties objectievere beoordelingen voortbrengen. In plaats daarvan gaat het bij verschillende opvoeringen (enactments) van kwaliteit om het navigeren door overlappende onzekerheden.

Hoofdstuk 4 onderzoekt hoe smaak en smaakzin hebben bijgedragen aan de transformatie van het stadslandschap (urbanscape) van Amsterdam, in het bijzonder wat ik beschrijf als haar bierlandschap (beerscape). Dit hoofdstuk bevraagt de opvatting van smaak als een passieve gewaarwording die is beperkt tot het domein van consumptie, zoals in uitnodigingen om ‘de stad te proeven’. Als je de stad inderdaad kunt proeven, hoe komt de stad dan tot de smaak die ze heeft? Ik laat drie gevallen zien waarin smaak respectievelijk ruimte, waarde en gegevens voortbrengt. Ten eerste, de historische rol van smaak bij het aanjagen van de Amsterdamse ambachtelijke bierscene, met name door de coproductie van nieuwe smaken en krakersruimtes in de jaren tachtig. Ten tweede, de (loon) arbeid van smaak(zin) in brouwerijen die waarde produceert en de metabolische

circulatie van bier bemiddelt. Ten derde, het delen van smaak en de productie van data op een geosociale bierbeoordelingsapp, Untappd, die veel wordt gebruikt in het gemediatiseerde Amsterdamse bierlandschap. De drie empirische secties van dit hoofdstuk bestaan uit interviews met brouwers, biersommeliers en sensorische-evaluatiespecialisten, etnografisch onderzoek bij brouwerijen en auto-etnografie van een sensorische evaluatietraining, en het gebruik van de Untappd-app. Door te stellen dat smaak(zin) productief is, presenteer ik het cultiveren van ‘goede smaak’ als een politiek-ecologisch project. Door te laten zien hoe smaak(zin) actief deelneemt aan de productie van ruimte, waarde en data, ontstaat een onderling verbonden maar tegenstrijdige dynamiek: een dialectiek van smaakegalisatie en -differentiatie.

Hoofdstuk 5 gebruikt de productie, circulatie, consumptie, recycling en verspilling van bier als een vehikel om na te gaan hoe goederen en infrastructuren verbeeldingen van een duurzame, circulaire toekomst materialiseren door ze te presenteren als zintuiglijk uitnodigend en als mogelijke routenaar sociaalecologische verandering. Amsterdam wordt niet alleen beschouwd als wereldhoofdstad van bier en brouwen, maar heeft ook de ambitie om een hoofdstad van duurzaamheid te worden door zichzelf te herscheppen als circulaire stad. Circulariteit is een zich snel verspreidende reeks vertogen en praktijken die tot doel hebben, of althans beweren tot doel te hebben, de relaties tussen productie en consumptie en tussen samenleving en natuur te reorganiseren. Er zijn opvallende parallellen met de manier waarop de beloftes van de moderniteit aan het begin van de twintigste eeuw werden ingebed in en uitgedrukt door de productie en tentoonspreiding van nieuwe goederen en infrastructuren. Gezien de mislukking om de beloofde rechtvaardige samenlevingen en getemde ecologieën te creëren, die onder meer door planners, architecten en ontwerpers waren verbeeld, lijkt het te getuigen van een vooruitziende blik om de opkomende denkbeelden rond circulariteit en het stedenbouwkundige paradigma ervan kritisch te onderzoeken. Door een analyse van beleidsdocumenten, publicaties van maatschappelijke organisaties en bedrijven, kranten- en tijdschriftartikelen, en stedelijke artefacten en vormen van architectuur en infrastructuur laten we zien dat recente veranderingen in de productie en metabolische circulatie van bier belangrijk zijn om het grote publiek in te prenten wat het ideaal van circulariteit is en hoe stedelijke infrastructuren op een nieuwe manier kunnen worden beheerd. We betogen dat bier en de verbonden infrastructuren en architecturen van de productie, circulatie en consumptie van bier worden ingezet om grootse en abstracte circulaire dromen herkenbaar en haalbaar te maken, niet alleen denkbaar, maar ook zintuiglijk, aantrekkelijk en bedwelmend.

Tot slot benoem ik in de conclusie drie overkoepelende thema's die naar

mijn mening verdere wetenschappelijke aandacht verdienen: proeven als weten, proeven als werken en proeven als verbeelden. Voor wetenschappers die geïnteresseerd zijn in de productie van kennis, bieden praktijken van proeven een vruchtbare mogelijkheid voor onderzoek naar belichaamde manieren van weten. Voor wetenschappers die geïnteresseerd zijn in arbeid, kan het bestuderen van zintuiglijke arbeid helpen om te ontrafelen hoe productie en consumptie in één enkel proces als intern gerelateerde momenten tegelijkertijd aanwezig zijn. Voor wetenschappers die geïnteresseerd zijn in verbeeldingen, biedt proeven een manier om te bestuderen hoe lichamen worden betrokken bij de productie van verbeeldingen en de inbedding ervan in het dagelijks leven, en hoe verbeeldingen vervolgens ook zelf belichaamd worden.

## List of Publications

- Tzaninis Y, Mandler T, Kaika M, Keil R. 2021. "Moving urban political ecology beyond the 'urbanization of nature.'" *Progress in Human Geography* 45(2): 229-252. doi:10.1177/0309132520903350
- Tzaninis Y, Mandler T, Kaika M, Keil R, eds. Forthcoming. *Turning Up the Heat: Urban Political Ecology for a Climate Emergency*. Manchester: University of Manchester Press





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