# The Toxic Sublime: Flowers, Time and and Toxic Matter in International Relations

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**Abstract**

Time in International Relations has traditionally been understood as a linear process. Some of the most innovative and 'fluid' approaches to time in IR are found in research located at the intersection of war, temporality and toxicity. However, these studies seldom escape the context of conflict. As such, this thesis sets out to develop alternative non-linear understandings of time in IR by looking at everyday toxic matter in the fresh-cut flower industry and poses the question 'How does the temporal relation between floral, human and environmental bodies connected through toxic matter in the floriculture industry recentre the question of time in IR?' Based on my personal ethnographic research conducted in New York City florist stores and scientific data drawn from studies on the use of pesticide in the flower industry, I develop a transcorporeal toxic timescape which captures the process of the *mattering of difference* through the *materialisation of temporalities* in which IR plays a role. Doing so, I found that my research recentres the question of time within IR in several ways. Firstly, it encourages the discipline to broaden its temporal imagination and acknowledge more-than-human non-linear accounts of time. Secondly, it draws attention to the role that IR plays in reproducing colonial legacies by determining which lives and deaths come to matter rendering certain futures (im)possible. And lastly, the consideration of alternative experiences of time opens up a space for a politics of responsibility attentive to the long-term material consequences of actions.

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To my dear family, I offer chrysanthemums symbolising honour, respect and support. Thank you for having taught me how to listen to the natural world and understand the meaning of unconditional love.

To all my friends, I throw some Lily's of the Valley representing a return to happiness and laughter, which you have provided me with through better or worse.

Lastly, for my partner, I will walk through a field of poppies with you for as soon as you pluck them they fade, just as love which can never be owned.

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# 1. Introduction

In all encounters between the human, non-human and material world, different temporalities interact, spill over, overlap and shape one another. In International Relations (IR), time has often only been thought of in human terms based on Western conceptualisations of linearity and continuity in which the past constantly flows into the future. Under a capitalist banner scholars have associated this with progress. Natural, material or geological temporalities are laid out on immense timescales compared to human temporalities, giving the sense that they form a timeless backdrop against human actions (Chakrabarty 2009, 205). However, with rising awareness of environmental degradation which goes hand in hand with a sense of urgency, time has collapsed onto us, come to a stop (Chao 2022) or mutated. As such, scientists have named the current epoch 'the Anthropocene' (Nading 2020) in which not only individual human actions, but also the discipline of IR have a decisive impact on temporalities of certain entities that are obscured by a linear conceptualisation of time.

In the world of today we are witnessing the rise of civil wars, famine, unhabitable areas, genocide, destructed environments and plagues. However severe, these are mere symptoms stemming from the same cause: a lack of long-term thinking and imagination. The people, environments and animals still bearing the consequences of chemical matter from past decisions - Hiroshima, Nagasaki, Chernobyl, Vietnam, Cambodia, amongst other - to the ones currently surviving in an unliveable climate - Sudan, Gaza, Haiti, Congo, and many more – highlight the failure of international politics to look past short-term gains and power plays. The traditional linear understanding of time in IR obscures the fact that bombs dropped in present/s will have adverse effects on multiple future/s. Time, as such, ceases to be a unitary

entity that progresses along a single narrative. Instead, it adopts various pathways combining a multitude of perspectives and stories.

Within the discipline of International Relations most linear anthropocentric conceptualisations of time are contested by research that reformulates the ontological frame of warfare as bound to the temporal boundaries of the 'event'. Multi-temporal, multi-species and multi-spatial IR approaches have conceptualised war not just as an event with a beginning and end date, but as a long-term process with many dimensions. Such accounts, however, rarely escape the context of conflict and exclude the 'un-eventful' material reality of human actions unrelated to the consequences of warfare. As such, this research paper seeks to recentre the question of time in IR and intervene in the traditional conceptualisation of temporal linearity by investigating material entanglements of the everyday and open up a possibility of long-term responsibility. The discipline of IR is a 'future oriented enterprise' (Berenskoetter 2011) attempting to understand and explain past events to mainly be able to predict the future (McIntosh 2015). I argue that to do so, IR needs to take into account the non-extraordinary, un-eventful materialisation of temporality as it produces time differently and renders certain futures possible.

To explore this gap in the literature, I develop a novel understanding of temporality that connects past, present and future and transgresses all (non-)human bodies it encounters: toxic matter. Specifically, I pose the question 'How does the temporal relation between floral, human and environmental bodies connected through toxic matter in the floriculture industry recentre the question of time in IR?' To contextualise this question, I will begin with a literature overview that critically discusses the role of time in International Relations. The review will also expand multi-temporal, multi-spatial and multi-species IR research on toxicity that has been conducted in the context of war to legitimise the necessity for a focus on un-eventful toxic matter. Then, Building on post-humanist and new-materialist theory

(Alaimo 2010, 435-438; Barad 2007; Neimanis and Walker 2014), I develop a framework of a trancorporeal toxic timescape to analyse how IR influences ordinary materiality and renders certain futures possible. Within this framework I conceptualise time and temporality as a non-linear and fluid phenomenon developing alongside multiple narratives entangled with materiality. Adopting a qualitative approach, I combine my personal ethnographic data from field research in New York City (NYC) florist stores that I conducted in 2023 with scientific data drawn from studies on the use of pesticide in the fresh-cut flower industry. Doing so, I will construct a transcorporeal toxic timescape exploring three temporalities that overlap the moment a fresh-cut flower bouquet is made: the temporalities of flowers, of the environment and of humans and how they are connected through toxicity. The temporal analysis is split in three subsections representing three transcorporeal intra-actions maintained through legal and international structures: (i) the past activities of production based on the scientific findings of the use of pesticides in the pre – and post-harvesting processes, (ii) the present moment and compartmentalisation of scientific research discussed according to scientific data featuring occupational hazards in flower stores and ethnographic data, and (iii) the possible futures of toxicants and their insights for alternative considerations of time within IR based on critical engagement with the US Green New Deal and the Green Deal EU.

Toxic matter as a matter that is everywhere and has become unavoidable, exists outside of demarcated events such as wars, nuclear explosions or leaks. It exists as invisible molecules floating through the air and in the water we drink, in infrastructure materials, or in exchanges marking our everyday life. It is through the stories that these invisible molecules carry with them and do not get shortlisted to stand in the spotlight of 'event', that I wish to broaden the temporal imagination of IR. Focusing on everyday life and materiality in the floriculture industry, I show how the past is never really 'left behind' and how IR plays a role in rendering certain futures possible. I integrate the multi-species, multi-temporal and multi-

spatial understandings that emerges from studies on war, time and toxicity with a politics that recognises the 'connectivity of phenomena on different scales'. As IR is struggling to grasp human finiteness, treat other human and non-human life as valuable and imagine our actions to futures that extend beyond individualised human temporality, new insights will be generated from analysing non-human temporal narratives.

Specifically focusing on toxicity in the flower industry exposes to what extend our current politics of 'being' have shaped the world around us and our inability to recognise our environment as a consequence of our own production (Toscano 2016). Coming from a farmers family that cultivated, amongst other crops, flowers, I have found a productive intellectual sparring partner in the subjectivity of a fresh-cut flower. My familial background allows me to relate to natural products independent of the capitalist processes of alienation and familiarisation through the awareness of the product's origins and labour input. As such, the invisible temporality of a flower as a seemingly harmless product symbolising beauty, purity and mortality has been chosen as a case study.

Facilitated through legal structures and the lack of international cooperation the intensive use of pesticides in the floriculture industry determines which lives and deaths come to matter. My aim is not to formulate a response to 'how to stop the pollution of our planet', but instead ask 'how do I participate in the materialisation of temporality or the *mattering of difference*?' I seek to create a sensitivity in IR to how our bodies participate in the constant materialisation of difference on a spatial and temporal level. By recognising the 'connectivity of phenomena on different scales' (Barad 2007, 247) and understanding how these phenomena are made through one another is already a politics of doing otherwise (Neimanis and Walker 2014). As time is interconnected with space, also spatial differences maintained by legal structures are created that render colonial power politics visible. As such, a 'politics of doing otherwise' creates possibilities for being and acting differently. The awareness of the

participation of IR in co-laboured temporalities opens up a space for intervening responsibly in the entanglements of which we are a part of and re-imagining long-term consequences of actions. However, intervening responsibly does not mean 'fixing past mistakes' as the past is equally the present and the future, but rather entails the incorporation of a politics that is attentive to the long-term material consequences of actions.

## 2. Literature review

### *2.1 Time in IR*

To contextualise my research question and the need for non-linear accounts of time within IR, I will critically review the role of time in International Relations. Then , I will provide an overview of IR research regarding the intersection of time and toxicity which has only been realised in the context of war. As such, I fill in the literature gap by developing a more-than-human and multi-temporal analyses of time based on un-eventful matter located outside of discourses of war.

Time in the discipline of International Relations (IR) is often taken for granted and overlooked as a factor that influences political and public life. Regardless of the approach and whether it is explicitly acknowledged, time and temporality play a crucial role in IR. As Felix Berenskoetter argues, IR is a 'future oriented enterprise' (Berenskoetter 2011) attempting to understand and explain past events to mainly be able to predict the future (McIntosh 2015). Mainstream research typically identifies time with traditional Western notions of clock - and calendar time (A. R. Hom 2018; McIntosh 2015). This privileges temporal understandings that prioritise generalised and time-invariant theories while devaluating temporal fluidity (McIntosh 2015). On the other hand, critical approaches highlight the temporal diversity of international relations and accentuate the dynamic character of time as opposed to static and

overly spatial mainstream analysis. As such, critical researchers try to redress the 'evasion of time' (Agathangelou and Killian 2016) in international relations and draw attention to the co-existence of multiple political times (Hesford and Diedrich 2009). Temporal analysis countering a homogenous and fixed conceptualisation of time are often inspired by feminist and decolonial critical perspectives.

One of the most influential critical scholars located at the intersection of time and international relations is Kimberley Hutchings. She conceives political unitary time as constructed through the 'control and direction of other forms of temporality' (Hutchings 2013, 4). To open up the complex web of world politics in an interesting way, she follows the decolonial and poststructuralist schools of thoughts arguing for an alternative view which 'conceives world-political time in terms of immanent, non-linear, plural becoming' (Hutchings 2013, 4). Hutchings builds on the canon of western political thought regarding questions of time and showcases that temporal assumptions have played a significant role in shaping world politics. Doing so, she divides the temporalisation of social life into two categories: (i) chronos the quantitative experience of time and (ii) kairos the qualitative conceptualisation of time which determines the direction of history (Rao 2018). The following paragraphs will be guided by this temporal categorisation to explore mainstream - chronos - and critical – kairos - writings about the role of time in IR.

Mainstream temporal analysis is often concerned with chronotic time characterised by a quantifiable and divisible medium in which life is lived (Rao 2018).). The chronos produces a universal time based on calculations, calenders and clocks. Such mainstream accounts shape theory construction on a deep level by de-emphasising alternatives that may better account for discontinuities in political practice and radical shifts in international structures. Time in IR is 'all but absent' (Hutchings 2013) making it possible for major theoretical strands in realism, Marxism, institutionalism, liberalism, constructivism and post-structuralism to craft an

'international' that transcends time (Agathangelou and Killian 2016) based on the assumption of a singular temporal unity. Different notions of time are obscured and spatialised over text which locks international politics in an assumed temporal singularity and linearity. Issues of temporality are primarily centred around the interpretations of history and methods of history making (Hutchings 2013) in which time is based on a production of history that requires the sequencing and dividing of time in a linear manner (Hutchings 2007). As such, politics for IR stem from a past that is known with a predictable future that inherently indicates progress. IR's identity, representation, discourses and social imagination stabilise themselves around the spatialisation of time, creating 'universal' notions of the pre-modern versus the modern (Agathangelou and Killian 2016). However, a mainstream temporal imagination based on linearity and singularity proves difficult when trying to make sense of the current moment in which multiple temporalities collide.

The discussions of the role of time in IR has recently attracted increasing attention from critical scholars in the past decade who are strongly motivated to conceptualise the plurality of temporalities in IR outside of progress/decline, pre-modern/modern and war/peace binaries. Similar to Kimberley Hutchings, critical scholars have generally been more interested in the power struggles and shifting character of kairos as opposed to chronos (Rao 2018). Analysing time as kairos draws attention to the lived experience of time and its potential to change, create or disrupt rather than merely endure it (« One Time, Many Times », s. d.). This resonates with the scholar Christopher Mclntosh who argues that temporal writings in IR have been limited to examinations of political practice that remain isolated (A. R. Hom 2018; McIntosh 2015). Each set of approaches in IR – be they realist, liberal, constructivist, or, static or dynamic – resolve issues of time regarding themselves rather than treating it as a separate issue that affects IR as a whole (McIntosh 2015, 4). Mclntosh proposes a conceptualisation of time and temporalities as a 'stand-alone issue' (McIntosh 2015, 4) to de-

naturalise the notion of time as linear and singular and articulate how different conceptions of time are systems of meaning that are constructed in practice. Doing so enables analysis that examine how time shapes the politics and practice of IR instead of the other way around. For example, Andrew Hom in his books (A. R. Hom 2018; 2020) steps away from clock – and calendar time and develops an IR temporal imaginary by arguing that all time stem from 'social and practical timing activities' (A. R. Hom 2020). These activities are attempts to create meaningful and useful relationships in complex and turbulent times. By drawing attention to the activities that reproduce time, he highlights how it is constructed through socio-cultural interactions. In the same vein, the edited collection *Time, Temporality and Global Politics* (A. Hom et al., s. d.), reframes key concepts in IR such as war, identity, security and inequality in temporal terms. They showcase how concepts shift and are constructed over time while being influenced by multiple temporalities that collide into the concept. Also decolonial scholars highlight the multiplicity of temporalities by problematising the framing of kairos as a unified and singular time of Western modernity (Rao 2018). In *Departures and Openings*, Narendran Kumarakulasingam emphasises that colonial temporalities never fully effaced other ways of relating to time. Building upon this, Anna Agathangelou and Kyle Killian (2016) insist that political projects that wish to disturb 'the present whose infliction is violent and fatalist' (Agathangelou and Killian 2016, 1) need to acknowledge these other ways of experiencing time. In their collection *Time, Temporality and Violence in International Relations* a number of writings touch upon the question of time from marginalised perspectives – migrants, indigeneity, statelessness, colonisation, childhood, slavery and homelessness. From these marginalised experiences, the contributors to the collection not only define how subjects are placed outside or inside 'universal' time, but also how they actively interact and shape their temporal locality.

However, as much as critical temporal writings problematise the linear framework of

time within IR, contradict the pre-moder/modern binary and introduce a multiplicity of temporalities in their analysis, they have been limited to human experiences of time. Anthropomorphising experiences of time obscures and overlooks other temporalities that also shape and are shaped by IR. Non-human temporal narratives highlight long-term consequences of certain demarcated 'events' as they can post-date individualised human temporalities and as such inspire long-term imaginations. One of those non-human temporalities is the persistent character of toxic matter that transcends time and space.

### *2.2 Time and Toxicity in IR*

Some of the most innovative and 'fluid' approaches to time in IR are found in research located at the intersection of war, temporality and toxicity. Already some post-humanist scholarly work in the field of IR, disregarding the question of time, has grappled with the inclusion of non-human entities. They attempt to replace the anthropocentric focus in IR with an interspecies conceptualisation of politics (Youatt 2014; Cudworth and Hobden 2023). By extension, such research formulates ethical guidelines in which our responsibility extend across species (Cudworth and Hobden 2021).

Researchers have studied time in IR from a multi-temporal, multi-spatial and multispecies framework by broadening our ontological and epistemological understanding of war. Doing so, they show the long-term consequences that transgress the temporal and spatial boundaries of war as an event by focusing on how chemical consequences of toxic matter contest war as a demarcated phenomenon. In *Late Modern War and the Geos* (Griffiths and Redwood 2024), Mark Griffiths and Henry Redwoods question the 'militarised ontology' of war that views conflict as a temporally and spatially precise event. They argue that by focusing on war ecologies and (non)human health the long-term consequences of war as an enduring and proximate intervention in the environment and life become apparent. Another scholar, Drake Logan, proposes the term 'toxic violence' to account for state violence that

uses toxic matter as a weapon of war (Logan 2018). Analysing chemical weapons used by the US in Iraq and Afghanistan, he argues that the violence of toxicities transgresses the boundaries between war and peace, life and death to the extent that 'Toxic violence blurs the usual temporal distinctions of wartime: it does not fade into an aftermath, but remains a live ember of war, a replicative violence, embedded in the fabric of everyday life.' (Logan 2018, 255). Connecting temporality, toxicity and multi-species research, Matthew Leep focuses on ongoing war processes in his article: *Toxic entanglements: Multispecies politics, white phosphorus, and the Iraq War in Alaska* (Leep 2023). Leep argues for an ontological shift that can account for more-than-human experience with processes of war that occur in other places then international warzones. In a similar fashion than the authors mentioned above, a multispecies analysis of toxic violences provides for him a more inclusive and accurate view of the cost and duration of war.

The scholarly research on toxicity and time in IR allows for the imagination of 'long-terms' by focusing on non-human temporal narratives. However, such interventions in the anthropocentric understanding of time have been limited to discussing the ontology of war criticising the spatial and temporal limitations of the concept of 'event'. As such, within current IR literature on time and toxicity there is a lack of research on the role of toxicity in everyday realities outside of the context of war. A focus of IR on everyday toxic matter is necessary as, discussed above, toxicity does not limit itself to certain timeframes, but rather embeds itself in 'the fabric of everyday life' (Logan 2018, 255). The materialisation of IR decision making processes is not limited to times of conflict, but extends to ordinary human actions and future realities.

## 3. Theoretical Framework

Time is experienced differently by every entity across human and non-human forms. To talk about human temporalities researchers can rely on forms of history production or collective realities and imaginaries. However, to be able to analyse multispecies - and material temporalities requires a different set of tools that allows for multiple temporal dimensions to co-exist, cross-over, and, interact. As I aim to develop a non-linear alternative understanding of time in IR, the following paragraphs develop a theoretical framework of a transcorporeal toxic timescape through which the intersection of time and 'ordinary toxicity in the floriculture industry can be understood. This framework provides an analytical lens that accounts for the spatial and temporal 'leakiness' of toxic matter. To do so, I draw on the framework of timescapes, as proposed by Barbara Adam (1998), which extends to non-human experiences of time and rejects a purely linear understanding of time. In a timescape, space and time are analysed as intertwined entities. However, due to the specific transgressing character of toxic matter, I further built on Simone Müller's and May-Brith Ohman Nielsen's conceptualisation of a timescape of toxicity. Specifically, Toxic timescapes focus on the intersection of toxic matter, time, space, and body while accounting for both the exceptional timeframe and transgressing spatial character of toxic matter. As such, merging both concepts not only highlights these intersections, but also renders the web toxic matter weaves by transgressing animate and inanimate bodies visible. Adopting a transcorporeal (Alaimo 2010, 435-438) understanding of temporality as proposed by Neimans and Walker (2014) and inspired by Karen Barad (2007) enables a more profound analysis of how the intra-actions of toxic matter with different bodies make time and constitute a perpetual becoming of the world. In this way the material accumulation of temporality and the mattering of difference of (non-) human bodies through toxic matter becomes tangible.

In most research, spatial analyses dominate at the expense of temporal research. The visible spatial dimension of human and non-human entities has been widely theorised while the temporal aspect has posed more conceptual problems. As such, I build my temporal framework on one of the first theorists that widened the scope of the study of time beyond human social time by including temporal scales of non-humans, namely the sociologist Barbara Adam. Her concept of *timescapes* also contains an inherent spatial feature, which is one of the reasons I choose her work to accommodate my research as toxicity's temporal specificities are interconnected with its spatial particularities. Particularly relevant to my research is her view on environmental issues that, according to her, are the result of actions whose impact remains invisible until their symptoms materialise 'some time, somewhere else' (Adam 1998, 18). Instead of highlighting visible space she focuses on invisible time tracing back the origins of materialised environmental concerns which, according to her, stem from the industrial way of life. As toxicity in the floriculture industry, the impact of buying a fresh-cut flower remains invisible because their harm materialises in 'insignificant' temporalities or 'distant' futures. Adams argues that 'other '-scapes' such as landscapes, cityscapes or seascapes mark the spatial features of past and present activities and interactions of organisms and matter, while timescapes emphasise their rhythmicities, their timings and tempos, their changes and contingencies'(Adam 1998, 19). By focusing on the temporal rhythmicity's of the materialisation of spatial '-scapes', Adam's framework allows me to study different geographical locations in an interconnected manner through temporalities that have impacts 'some time, somewhere else'.

Similar to toxicity, industrial time, that consists out of machine, economic and laboratory time, has the ability to transform time and turn it into a manipulatable commodity. As I will later elaborate on, toxic matter also has the ability to transform – shorten or prolong – time. As such, timescapes allows for the study of time and space characterised by its

multiple, overlapping and intersectional features surpassing anthropocentric approaches. It enables me to connect different geographies and temporalities by analysing the timescape of, for example, a cloud that carries matter of the past and present into the future. However, even if timescapes are intertwined with space, toxicity's peculiar spatial character transgressing existing boundaries between human/non-human, global/local and animate/inanimate requires a more specific conceptualisation of the relation between space and time. As I analyse temporalities in the flower industry following the different temporal bodies toxic matter encounters, I adopt a 'toxic timescape' that accounts for the particular spatial features within toxic temporality.

To further develop my understanding of the intersection of time, space, body and toxic matter, I build on the edited collection of Simone Müller and May-Brith Ohman Nielsen: '*Toxic Timescapes: Examining Toxicity across Time and Space*'(Müller and Nielsen 2023). Toxic timescapes account for the 'multiplicity and intersection of temporal and spatial scales working on the human and non-human body in relation to toxicity, pollution and contamination'(Müller and Nielsen 2023, 17). It challenges linear conceptions of time and explores how toxins and toxicants permeate time and space creating 'more-then-human narratives'(Müller and Nielsen 2023, 19). I particularly draw on the their conceptualisation of toxic matter as always relational (Nading 2020) and never static (Müller and Nielsen 2023) implying that its study relies on how time, space and bodies - animate and inanimate - relate to toxicity. This creates a framework in which toxic temporality can only be comprehended in relation to its spatial characteristics - the effects and consequences it has upon or within bodies it transgresses and comes into contact with. For my research, toxic timescapes are an adherent framework to study toxic relationality in the context of the floriculture industry where floral -, environmental-, and human bodies are connected through the transgression of toxic matter.

As I aim to conceptualise not only the spatial - but also the temporal 'leakiness' of toxic matter and how it interacts with other temporalities, a certain sense of continuity across bodies in time and space is needed. Toxicants in the flower industry not only affect the materiality of the bodies it transgresses, but specifically impact their temporalities. Instead of analysing toxic temporality intertwined with its transgressing spatial characteristics, I analyse temporality itself as a transgressing feature. As every timescape is singular, the manipulation of time in the case of flowers urges a focus on the temporal interactions between bodies. Inspired by the scholars Ilenia Iengo and Marco Armiero (2023, 187-211) who use transcorporeality in toxic timescapes to elaborate on corporeal storytelling of toxicity, I will merge 'transcorporeality' (Alaimo 2010, 435-438) with the framework of toxic timescapes.

The additional nuance that transcorporeality brings to my research is the understanding of material encounters as intra-active (Barad 2007). As an extension of an interaction, in an intra-action bodies participate in an process of mattering with each other. The concept of 'transcorporeality'(Alaimo 2010, 435-438) conceptualises the enmeshment of all embodied beings with the dynamic, material world which transgresses them, transforms them and is transformed by them. This intra-active encounter accentuates not only how toxic matter passes through bodies, but also how it brings about change and is changed through transgressions with other bodies. The subject/body cannot be separate from networks of intra-active material agencies (Barad 2007) and must come to terms with the material entanglements of substances, bodies, objects and environments it traverses, encounters and is already entangled with. As such, the encounters between toxicants, flowers, humans and environments are actively transforming one another materially and temporally.

To extend trancorporeality to the study of time, I draw from Astrida Neimanis and Rachel Loewen Walker article on *Weathering: Climate Change and the 'Thick Time' of Transcorporeality* (2014). They analyse more-than-human temporalities as a transcorporeal

body interacting with other temporalities. Similar to Alaimo, Neimans and Walker also draw from Karen Barad's theory of intra-actions which upholds that the world materialises through intra-actions of emergent relata; things-in-phenomena (Barad 2007). They use *transcorporeal temporalities* to showcase how intra-actions of different bodies make time. It is by making time through intra-actions that bodies and temporalities come to differ from one another; a process that is also termed the *mattering of difference* (Barad 2007). Building on Neimans and Walker's article, I analyse toxic matter in the floriculture industry through a transcorporeal toxic timescape. As such, I do not merely frame the concept of transcorporeality through toxic timescapes, but propose to view time itself as a transcorporeal entity. In this sense, I analyse both toxicity's capacity to transform time and permeate space, and its ability to *make time differently*. The seemingly fixed boundaries of bodies and temporalities collapse in/onto each other, while new separations and differences are created. With the conceptualisation of toxic time and space as relational and intertwined, and, temporality as a transcorporeal entity , I aim to capture the process of the *mattering of difference* in the flower industry.

### *3.1 Conceptual Frame: A Permanently Polluted World*

Toxicity has become an unavoidable, yet unevenly distributed condition permeating all life and non-life in our modern epoch. Scholars have defined this condition as the 'new age of toxicity' (Walker 2011, ix) which is 'the ubiquitous condition of chemically altered beings, a condition that is shared but unevenly so, and which divides us as much as bounds us' (Murphy 2017). Becoming aware of living in a toxic world allows for the imagination of potential new forms of relating to time with other human and non-human entities.

Toxicants transgress the boundary between human/non-human and animate/inanimate matter, global/local, and, inside/outside rendering them 'leaky' and creating openings for new (dis)connections. The transportation of toxicants can be both passive through water and air currents or active through commodity and production chains (Geissler and Prince 2020).

Toxicity both ‘disrupts existing orders and ways of life at some scales while maintaining and enabling ways of life at other scales’ (Liboiron, Tironi, and Calvillo 2018, 1). The implosion of divides due to its transgressive character goes hand in hand with the implosion of a linear understanding of time (Müller and Nielsen 2023). Toxicants can rain down on a specific geographical area while being the result of past toxic activities in distant territories. Their persistence in facing the ravages of time, connect past activities to future toxic environments. As such, planes, flowers, neoliberalism, militarisation, sand, slavery, fish or colonial dispossession are all part of a ‘complex of chemical relations that extend outward in place, and into the past, as well as forward into certain futures’ (Murphy 2008, 696).

Based on the theories mentioned above, I understand time as a non-linear and fluid phenomenon developing alongside multiple narratives entangled in materiality. Moreover, I consider bodies in space to be intertwined with their respective temporalities. Their encounter not only restructures materiality spatially but also actively makes time differently; changing the materiality of temporality. In this sense, I analyse both toxicity’s capacity to transform time and permeate space, and its ability to make time differently.

In the case of the fresh-cut flower industry, what connects floral, environmental and human temporalities with one another is not only their mere encounter, but also their manipulation due to exposure to toxicants. The intensive use of pesticides, insecticides, chemical fertilizers, fungicides and herbicides make up a particular toxic timescape crossing different bodies throughout the production and consumption process. By transgressing environmental, animal, floral and human bodies ‘the external and internal boundaries of the body collapse’ while ‘the different temporalities of toxins, communities, environments or individuals collapse in the body illustrating the exceptionality of toxic time where past, present and future seem to co-exist’(Müller and Nielsen 2023, 192). As such, the temporal intra-action of the bodies toxic matter transgresses will be explored to render a transcorporeal

toxic timescape visible. This framework enables a dynamic analysis of spatial and temporal bodies that intra-act in a process of materialisation bringing a novel perspective to time in IR by understanding time as something that is *made* and *reproduced* in which IR plays an active role.

## 4. Methodology

To answer the research question, 'How does the temporal relation between floral, human and environmental bodies connected through toxic matter in the floriculture industry recentre the question of time in IR?' I adopt an interpretive qualitative approach. This approach consists of two sets of data gathered through two different methods; (i) primary data from my ethnographic research in New York City flower stories and (ii) secondary data from a content analysis of existing scientific literature on the use of toxicants in the floriculture industry. As floral, toxic or environmental time is not a quantifiable entity according to calendars and clocks (chronos), a qualitative approach is needed to develop an understanding of time based on lived experiences (kairos). Based on my participant observations, I gathered data on human experiences in relation to floral and toxic temporalities. However, I could not use the same approach to understand floral, environmental or toxic temporalities due to a lack of time and resources. As such, scientific data on the impact of pesticides on human, floral and environmental temporality allowed me to conceptualise non-human time which I interpreted in a non-linear manner accounting for the multivalence of time. Moreover, as toxic particles are invisible to the eye and hard to study through ethnographic research, these numbers also enabled me to 'see' and observe the presence of the invisible during my participant observations.

During my exchange semester in New York City from September to December 2023, I conducted four 90-minute participant observations in florist stores; one in Williamsburg, one in Hell's Kitchen and two in Greenpoint (see table below). New York City was chosen as the location for ethnographic research as it is the hub of the ornamental flower industry where contrasts between production and consumption are accentuated making it a productive environment for my research. Most of the 'average' florist stores in NYC get their flowers from intermediate sellers and do not make personalised bouquets, but sell premade floral assemblages. Thus, most knowledge about the origin of the flower and, by extension, the toxicants used in the industry are lost in the commodity chain. For this reason, the florists stores were chosen based on their prestige, the possibility of buying personalised bouquets and the quality of the flowers on display. The flower market in NYC is highly competitive, which means that high end flower stores fight over the best traders and are the first get access to the flowers as soon as they land on US mainland. As such, it was more likely that florist working in those stores had more knowledge about the flowers they were selling.

I looked up florist stores online to assess the services they offered, variety of flowers that they sold and ensure that the store was located within NYC reachable with public transport. With this selection method, I was able to filter out prestigious florists that only provided flowers for public and private events meaning that they did not make fresh-cut flower bouquets and that their atelier is an ever-changing space based on the size of the order and kinds of flowers. As experiencing time deeply takes a certain routine and familiarity, I was looking for more 'stable' high end florist stores. Without success, I send out emails to the selected pool of 10 florists to gather more data regarding the origin of the flowers and ask for permission. Thus, I decided to approach them personally and spontaneously ask if I could conduct a participant observation in their store. Due to time constraints, I approached the ones for which I did not have to travel long distances. As I was located in a well-off white area in

Brooklyn – Williamsburg – the florists and clientele of the shops I visited were predominantly white. From the four florists that I approached, all agreed to accommodate me. Concerning ethical considerations of my research, I decided to be transparent and let them know the purpose of my participant observation. However, I did not explicitly mention my focus on toxicity as I wanted to facilitate dialogue and avoid being considered as a critical outsider. As such, I strategically decided to start of with my personal familial connection to flowers and only bring up the use of pesticides near the end of my participant observation. My conversations with the florists followed the format of a semi-structured interview. I asked the same two questions to every florists: (i) where do the flowers come from, and, (ii) do you experience any negative consequences due to the toxicants used in the floriculture industry. The first question I choose specifically to find out the origin of the flowers and to facilitate a conversation about the production process of flowers that is mostly located outside of the United States. The second question I posed towards the end of my participant observation, as I perceived most florists to be less talkative afterwards. With the latter question, I hoped to get more information about their awareness regarding the intensive use of pesticides, to what extend it impacted their everyday lives and whether or not they were worried about it.

My participant observations play an important role in the sense that they brought my attention to the flow of time in contrast to floral death. While consciously being present in a flower store I learned how to relate to flowers more deeply, how to recognise which kinds were imported from elsewhere and how much time they 'had left'. My conversation with the florists allowed me to tap into their relation with the flowers which is imbued with feelings. Flowers are way more than mere commodities to them. These experiences allowed me to recognise temporal meanings of scientific research and connect them to the broader framework of a timescape. Through my ethnographic research, I could interpret the scientific data in the production - and consumption process as interconnected.

| Name of Florist Store | Location | Date |
|---|---|---|
| Rosehip Social Florist | Williamsburg, Brooklyn | 13/10/2023 |
| Seasons, A Floral Design Studio | Hell's Kitchen, Manhattan | 02/12/2023 |
| Paradise Florist | Greenpoint, Brooklyn | 08/12/2023 |
| Mc Nino Design Floral and Events | Greenpoint, Brooklyn | 14/12/2023 |

*Figure 1. List of Participant Observation in NYC Florist Stores*

A content analysis of scientific literature regarding the use of toxicants in the flower industry constitutes the thick data of this research project. Using snowballing as a research technique, I conducted an in depth google scholar search based on the keywords regarding the floriculture industry: pre- and post-harvesting processes, use of chemicals, occupational exposure, health – environmental consequences of pesticides. Screening through the articles, I identified a set of papers such as *Risk factors to pesticide exposure and associated health symptoms among cut-flower farmers* and *Identifying pesticide use patterns among flower growers to assess occupational exposure to mixtures*, that feature the temporal dimension in the form of floral vase life, health consequences, environmental degradation and occupational exposure hazards. I split the selected papers in three groups: (i) research regarding the pre- and post-harvesting process, (ii) research regarding occupational exposure in florist stores and (iii) research tracing where toxic matter ends up after the body of the flower dies. The papers in each set were read carefully and, through a cross-comparative analysis of their results, I could establish which practices were commonly used across countries. Gathering scientific data was extremely helpful in giving concrete evidence for the use of pesticides that was rendered invisible at the site of consumption. Especially through the vast body of scientific research conducted on the pre- and post-harvesting process, I was able to connect my ethnographic data regarding floral life and death with how toxicants influence temporalities

during production.

However, there are several limitations to my approach. Firstly, my ethnographic data is limited to four participant observations, which limits the variety of the database. Secondly, very little scientific research is specifically conducted on where and how the toxicants in the flower industry 'end up'. As such, in the 'future' part of my analysis I will reflect on what a more-than-human timescape could mean for IR based on US Green New Deal and the Green Deal EU for a more sustainable future. Third, as a researcher I am unable to escape the 'human gaze' with which I look at non-human temporalities. As much as I contest anthropocentric conceptualisations of time, it is important to keep in mind that I will never be able to fully grasp how a flower experiences time. Lastly, there have been some efforts to make the floriculture industry more sustainable and decrease the use of pesticides. This would have been outside of the scope of my thesis, but could be interesting for a cross-comparison case study analysis in future research regarding how temporality changes in the case of unsustainable and sustainable floriculture production. Overall, the primary dataset concerning my research allowed me to experience time with the florists and through them with the flowers while the secondary dataset enabled me to notice what is not visible; toxic matter. Moreover, the latter enabled me to grasp floral, environmental and human temporalities and connect them to the immediate moment in the flower store.



## 5. Empirical Analysis

*Sitting in the back of the flower store in Hell's Kitchen in the heart of NYC, I observe the swift movements of the florist's hands. He chooses flowers from different vases scattered around the store and assembles them into a bouquet. Red, White, Green and Bordeaux. The aesthetically pleasing ensemble emanates a welcoming warmth that promises the beholder a*

*romantic time. The flowers he chooses will soon die, whilst he will remain. The dying flowers will not be remembered by their fleeting beauty but only by the material traces of toxicants they leave behind in the bodies of human, soil, air or the water polluting the environment. It's rather strange that at the same time toxicants is what enables flowers to be aesthetically perfect and survive the journey to NYC in the first place.*

- *Field Note in Seasons: A Floral Design Studio, Hell's Kitchen 02/12/2023*

Spending time surrounded by flowers and plants in NYC allowed me to understand the fleeting temporality of flowers differently. They grow fast and die soon, but throughout the process they need patience and meticulous care. Being attentive to the small changes, you start to understand the flower and notice when it has what it needs or when it does not. Through these caregiving practices, flowers become companions and their floral life suddenly does not seem so ephemeral anymore.

*[A florist about her relationship with flowers]*

*'Its personal to me, they are like my little friends. I just love flowers, they heal me and make me happy just by touching them. It's a part of mother nature, it's a living thing. Every time I cut I go: I know it's going to hurt and then auch. They are my little babies and when I make a bouquet and give it to the costumer I tell them to be nice to my flowers and to take care of them. I take care of them, buy them, clean them, change their water and then they go off to the world*

- *Field Note in Mc Nino Design Floral and Events, Greenpoint 14/12/2023*

Florists encouraged me to understand flowers on a deeper level and to appreciate them despite the inequality and pollution their existence entailed. In a sense, these experiences, conversations and encounters brought me back to my own roots as much as they also brought me to the roots of the flowers. Reconnecting with my own and the flower's roots 'far away'

also entailed the imagination of the end of floral matter while toxic matter remains. As I got acquainted with the floral world of pots, paper wrapping and chemicals I discovered a space in time full of paradoxes where the connection with nature was sacred but covered with chemicals. I found it intriguing how easily these contradictions existed besides one another. Apart from the presence of chemicals on a 'natural' entity, I found another contradiction regarding the aesthetics of fresh-cut flower bouquets. I watched the hands of the florists at work long enough to remark that floral elements associated with 'wild' nature such as thorns or leafy stems were removed to make space for an aesthetics fitting 'civilisation'.

*I look around in the store and realise that the everyday movement of a florist consists out of making wildflowers look aesthetically pleasing, cultivated and tame. Everything looks clean and in order. Not according to THE order one finds in the natural world, but IN order as decided by the human eye. In the middle of the shop the fresh-cut flowers are grouped in vases according to their species, and on the sides the carefully crafted bouquets are waiting to become the subject of yet another commodity transaction.*

- *Field note in Rosehip Social Florist, Williamsburg 13/10/2023*

The aesthetics of flowers are both embedded in 'civilised' codes of symbolic meanings, beauty, mortality, spring, perfection and purity, and in legal and international structures. The ornamental flower industry presents exquisite visual aesthetical quality, that is, the absence of damage and harm. The global trend of fresh-cut flowers has known an upward trend in recent years requiring high quality standards from exporters (Pereira et al. 2021). Nevertheless, flowers are highly perishable due to their natural metabolic processes such as yellowing of leaves, loss of stem turgidity or loss of petals (Menegaes et al. 2020) which decreases their commercial value The growth of a flower is a delicate process vulnerable to pests, especially insects and fungi. Various cocktails of pesticides, herbicides and chemical fertilisers are used

in the pre- and post-harvesting stage of flowers to retain their freshness and display quality (Lesmes-Fabian and Binder 2013; Singh, Sharma, and Sahare 2022). The main incentives for the use of chemicals are the (i) genetic manipulation of the plants that often removes the wild gene that promotes their natural defences (Tripp, s. d.), (ii) the demand for high quality products of the international market (Miller 2012) and (iii) the lack of regulations regarding the amount of pesticides used on non-edible flowers (Pereira et al. 2021). Regulations on the use of pesticides regarding the cut flower trade, or lack thereof, reflects the floriculture commodity chain, structured by the dynamics between buyers – the importing countries - and producers – the exporting countries.

Legal structures and international structures materialise a specific toxic timescape in the flower industry. Thinking time and space as intertwined made me realise that not only materiality is managed by international structures, but also their temporalities. On the one hand this reflects ongoing colonial and imperial ties in the international system and on the other highlights the need for a long-term politics of responsibility on the global level. As such, intertwined with the temporal analysis I will highlight how the use of toxicants in the floriculture industry is maintained and facilitated through international legal structures.

The toxic timescape is a transcorporeal entity in the sense that not only matter, but also its temporality is trancorporeal. In the flower industry the transcorporeal intra-actions between flowers, toxic matter, environments and humans make time and stretch between past, present and future. This rather peculiar timescape will be explored in detail below building on scientific and ethnographic data. Taking the moment a fresh-cut flower bouquet is made as the point of departure, I will trace the transcorporeal toxic timescape back to the past and towards the future. Doing so, I will follow toxic matter as it persists through time and space and connects the human, floral and environmental bodies and temporalities. In the ‘past’, the production process of flowers constitutes the first transcorporeal intra-action in which

difference start to matter. The use of pesticides in the pre- and post-harvest 'shorten' environmental, animal and human temporalities while 'prolonging' floral life. As such, the initial transgression of toxic matter through floral, human and environmental bodies transforms temporalities, making time differently and materialising the toxic timescape of the industry. The 'past' then extends into the presents moment of a florist making a bouquet. In the flower store the second transgression of toxic matter from the flower to the florist takes place. This encounter is a continuation of the transcorporeal toxic timescape, bringing the past into the present. Here the spatial aspect of temporality will be elaborated upon which highlights the underlying power politics and colonial legacies of the flower industry reproduced by the compartmentalisation of the production of scientific knowledge. Lastly, the past and the present stretch into the future. The final transgression that will be discusses, takes place when the body of the flower dies and toxic matter prevails escaping into the soil, air or waterways. In this sense, the future is not merely an unfolding of the past and the present. Rather, the past and the future are participants in the mattering of temporal difference. When the body of the flower dies and the toxins it contains 'leak' out, they expose the multivalence of time. I will take this opportunity to tie my analysis back to the question of time in IR and reflect on what it means to hold everyday material temporalities into account based on the US Green New Deal and the EU Green Deal for more sustainable futures.



### *5.1 Transcorporeal Toxic Timescapes in the Floriculture Industry*

#### *5.1.1 Transgression One: Past Production and Labour*

*In summer, they proudly explained, the flowers come from the garden of the owner located north to New York City. In the winter, the flowers are imported from overseas. They could not exactly remember from which countries specifically, but Ecuador was definitively one of them.*

*I was surprised, and pointed to the big number of exotic flowers in the shop to explain my confusion as to how the owner grew them in her garden. They nodded in agreement and said that those indeed also come from overseas. The young women and producer of the rhythmic sounds spontaneously shared, as if it was a must to mention in this conversation, that they were aware of the environmental impact of the fresh-cut flower industry because they need a lot of carton boxes to transport them in.*

- *Field note in Rosehip Social Florist, Williamsburg 13/10/2023*

The term 'overseas' is one I heard regularly when asking about the origins of the flowers. Who did the labour there and how the production process worked, was as vague as the term itself. Ironically, in that moment as a European in NYC, I also came from overseas. I was aware of the matter that I brought with me in my suitcase, however, that of the flowers surrounding me was a mystery. They were cut off from their roots and transported here to a foreign place to be sold and find their final resting place. In my search for what it took the flowers to be here, I found mixtures of chemical compounds that would keep the flower fresh long enough to be displayed in NYC vitrines. The toxicants used in the production process of flowers 'overseas' do not only affect the flower itself, but have adverse consequences on the surrounding environment and humans working on the flower plantations. To be able to analyse the intra-acting temporalities in the processes of production, I will delve into the scientific findings on the use of pesticides in flower plantations and analyse at what cost some temporalities get shortened while others are prolonged.

In regard to the environment, pesticides and chemical fertilisers used in the floriculture industry often leak into the water, soil or evaporate into the air, contaminating the area. Untreated pesticide affluents from the flower production are dumped in bodies of water (Pereira et al. 2021; Leipold et Morgante 2012; Lesmes-Fabian et Binder 2013; Querejeta et al. 2012). Some results have identified chemicals that are considered very toxic to and have

long lasting adverse effects on aquatic life (Jansen and Harmsen 2011) . The use of pesticides in greenhouses and on flower plantations are also absorbed by the soil, which contributes to the reduction of biodiversity and decreases the metabolic rate of the soil. This leads to biomass loss over the years which threatens the ecosystem as a whole (Aguirre 2004). In addition to terrestrial and aquatic deterioration, pesticides can travel long distances through air currents polluting distant environments through wet disposition – rain (Guida et al. 2018). As such, toxicants used in the production of flowers can pollute protected natural reserves or end up in other countries where their use is illegal (Khaoula Toumi et al. 2016). Environmental temporalities are threatened and shortened due to constant exposure to toxicants leading to the loss of life and the deterioration of the ability of the environment to regenerate over the years. However, I would like to note that natural and geological temporalities stretch over immense timescales in contrast to human time. As such, toxicants deteriorate the environment in the immediate moment, but in the grander scheme of things this is only a 'blib' on the timescale of the planet.

Regarding human temporalities, most harmful effects on human health in relation to the floriculture industry have been reported in exporting countries where the use of pesticides is high (Pereira et al. 2021). The health effects that have been recorded as a result of occupational pesticide exposure range from dermal to oral and respiratory issues. Flower production workers reported fatigue, headaches, blurred vision, heart palpitations, coughing and respiratory issues (Hanssen et al. 2015). Regarding medical consequences and/or *endpoints* the adverse effects are varied ranging from genotoxicity (Gómez-Arroyo et al. 2000; Castillo et al. 2006) - toxicants damaging the genetic formation within a cell increasing the possibility of cancers – to neurological issues (Handal et al. 2008; de Graaf et al. 2022; Friedman et al. 2020) and reproductive disorders (Tielemans et al. 2007; Handal et al. 2008; Fucic et al. 2021). Regarding the latter, male floriculturist produce 60% less sperm then

average men with a decreased concentration and motility (Mehrpour et al. 2014). Also women's infertility rates in the floriculture industry are high. As a result, they experience 3.4 times more miscarriages than average women (Fucic et al. 2021). The children of floriculturists or born in proximity to flower production areas show an increase in abnormalities as well as neurological alterations in their communication capacities and fine motor skills (Friedman et al. 2020). These adverse consequences on floriculture workers, shorten their lives through diseases and, in some cases, even obstruct the lives of future generations. As such, pesticides not only shorten human temporality, but also make time come to a 'stop' preventing other temporal bodies to come into existence.

The adverse effects of pesticide exposure on environmental and human temporalities come at the expense of prolonging floral life. To export flowers and maintain their commercial value, the prolongation of floral vase life is a central aspect in the floriculture industry and closely linked to the use of toxicants. The vase life of a flower varies according to their species, but is also affected by both pre- and post-harvesting conditions (Menegaes et al. 2020). To maintain pre-harvesting aesthetical quality, post-harvesting transportation, hydration, conditioning, temperature, storage and packaging (Menegaes et al. 2020) are important factors. However, to specifically prolong floral vase life preservatives containing a wide array of chemicals are used (Lan et al. 2022). Post-harvesting methods also have a harmful impact on the environment and human health as they contain high amounts of chemicals in the form of soluble preservatives (Singh, Sharma, et Sahare 2022; Lan et al. 2022; Menegaes et al. 2020). These preservative solutions contain silver compounds, cobalt compounds and aluminium sulphate, amongst others, which are recognised as harbouring toxic effect for (i) humans such as cancer, respiratory issues, skin and eye irritation, blood cell changes, liver and kidney damage or in some cases even death (Singh, Sharma, and Sahare 2022) and (ii) the environment as they often find their way to natural bodies without having

been threatened. Nevertheless, they have proven to be especially efficient in increasing floral longevity and preserving aesthetical quality. As such, the prolongation of floral life and ensuring its aesthetical quality, transform other temporalities.

The encounter between toxic matter, floral, human and environmental bodies entails the trancorporeal intra-action of matter and temporality. To conceptualise a toxic timescape as a trancorporeal temporality means to think of bodies as part and parcel of the making of time, as they intra-act with both materiality and temporality. The material entanglements present in the production process, make time different by shortening human, animal and environmental time while prolonging floral life. In this specific case, the respective temporalities are materialised through their encounter with toxicity. As such, toxic matter connects the different matter and temporalities of bodies across species and (non-) human boundaries. It is precisely because time is materialised in these intra-actions that bodies come to differ, which is the process of *mattering of difference* (Barad 2007). Karen Barad urges us to approach the process of *mattering of difference* with attention to the human embodied power politics at play in the making of toxic timescapes and the colonial mapping of its impacts (Neimanis and Walker 2014).

These colonial power politics are reflected in the spatial distribution of temporal impacts of toxic matter that are reproduced and maintained through legal and international structures. The European Union, specifically the Netherlands, together with the US, Russia and Japan are the world's largest importers (Faust and Dole 2021). Regarding exports, the Netherlands takes the lead followed by Colombia, Ecuador, Kenya and Ethiopia (Faust and Dole 2021) whose climate allows for the all-year-round production of flowers with cheap labour availability. Importing countries have strict regulations in place regarding pests, imperfections and aesthetical appearance of fresh-cut flowers (Pereira et al. 2021). However, as fresh-cut flowers are considered non-edible, Maximum Residue Limits (MRL) -

regulations concerning the use of pesticides on imported *edible* products - do not apply. As a result, exporting countries direct their efforts to avoid the refusal of their products at Western borders (Pereira et al. 2021) which increases the incentives to use chemicals. Nevertheless, International efforts have been made to ban persistent and highly toxic pesticides. These have proven inefficient as action is not undertaken simultaneously in different countries. Due to the spatial and temporal transgressing character of toxicants, it tends to be difficult to control their use based on fixed borders. Pesticides do not 'obey' lines drawn on a map and travel from countries where they are permitted to countries where they are banned (Meire et al. 2016). This, further challenges the local/global, inside/outside and past/present/future divide, but also reflects a false sense of safety or purity from toxic matter in countries that banned certain chemicals. As previously discussed and highlighted by the spatial distribution of toxic impact, time is interconnected with space in the framework of a timescape. As such, not only temporal, but also spatial differences maintained by legal structures are created between the site of production and the site of consumption that render power politics visible.

### *5.1.2 Transgression Two: Present Moment of Consumption*

*The sound that draws my attention back to the young women in front of me is rhythmic:*

*Stem is cut*
*Unorderly leaves stripped off*
*Ugly flower buds removed*
*Thorns removed*
*Again, and again*

*After a while it almost starts to sound violent, painful, as if the last parts of its roots were cut off…*

- *Field note in Rosehip Social Florist, Williamsburg 13/10/2023*

The moment a fresh-cut flower bouquet is made is fascinating to observe. The hands of the florists move efficiently and elegantly to put the flowers in an aesthetically pleasing order. They are aware of the texture of the petals, the complementing colour palettes, which vases go well with which bouquets and what flowers they can offer for which budgets. However, there is little awareness of the toxicity that the flowers bring from 'overseas'. One florist did not believe that the use of pesticide on flowers was legal, two others stated that their exposure is insignificant compared to that of the plantation workers and the last one opinionated that the use of pesticides is too restricted these days. Analysing the second transgression of toxic matter from the floral body to the human body, demonstrates that the process of the materialisation of temporality and, by extension, the mattering of difference is less visible/sensible in the site of consumption.

The pesticides, herbicides, insecticides and fungicides used during the pre-harvesting period, travel with the flower to the present site of consumption. As florists come into contact on a daily basis with chemical products used in the floriculture industry, toxic matter from the floral body transgresses the human body. This has adverse health effects for florists. During the making of fresh-cut flower bouquets or the handling of contaminated flowers, chemical compounds are transferred and absorbed by the skin. Concentrations of pesticide residues on floriculturists' hands are 1000 times higher then concentrations that are usually found on food products (Khaoula Toumi et al. 2017). From the detected active substances, several can potentially cause skin irritation, allergic reactions, eye damage and skin burn after dermal exposure (K Toumi et al., s. d.; Khaoula Toumi et al. 2017). None of these are fatal when coming into contact with the skin. However, seven other detected substances have potential chronic hazardous effects such as damaging fertility, harming unborn children or breastfed children and causing genetic deficiencies. Another ten substances can cause cancer after

prolonged or repeated exposure (Toumi et al. 2016). In a survey (Morse et al. 1979), florists frequently reported headaches (20%), watery eyes (20%) and skin irritation (20%) after exposure. In another set of interviews only one participant mentioned recurring headaches and tiredness, but many of them reported skin irritation, skin allergies, itchy skin, respiratory issues and thyroid problems (Toumi et al. 2016). In general, the adverse effects of toxic matter on florists are inconclusive (Toumi et al. 2016) and the risk relatively low compared to plantation workers.

The 'invisibility' of toxic matter in florist stores showcase two interesting aspects: (i) how scientific research is conducted in a compartmentalised manner and (ii) the influence of space on time encoded in colonial power politics. Scientific research focuses on the impacts of toxicants on certain bodies in a certain space. In the previous chapter regarding the 'past' processes of production, scientific results were concerned with human health and environmental wellbeing regarding the areas surrounding the flower plantations. In a similar fashion, the scientific research conducted in flower stores remains limited to measuring the impact of toxicants on the bodies in that particular time and space. On the one hand this reduces bodies to individual entities and toxic matter to measurable symptoms. On the other hand, the compartmentalisation of scientific research fails to account for the material and temporal interconnectivity of certain phenomena. Instead of finding the actions in the site of production harmful in contrast to the unharmful actions in the site of consumption, analysing the scientific findings in both spaces through a temporal lens, I was able to show how they make time differently together and how one is not temporally isolated from the other. Examining the impacts of toxicity in florist stores in a vacuum leads to the inability to recognise our environment as a result of our own production as it disconnects the action of buying something from the way the product has been produced. Due to the spatial and temporal compartmentalising of the production of scientific knowledge, toxic matter is

rendered invisible in consumption spaces as the relatively moderate adverse effects on florists is isolated from the severe negative impact of pesticides on floriculturists.

As such, the transcorporeal intra-actions of toxicity between the flower and the human in NYC flower shops are considered less prominent. Toxic matter continues to prolong the temporality of the flower through soluble solutions, but interacts in a less visible/feelable way with other embodied temporalities. This reveals the influence of space on time encoded in colonial mappings of the distribution of toxicity and reproduced by the production of scientific knowledge. The mattering of temporalities in the floriculture industry is more present in the site of production, often located in the Global South (Etheredge and Waliczek 2022), then in the site of consumption, mostly based in the Global North. As such, the governing legal structures manage not only which temporality matters, but also the space in which differences comes to matter. These disparities translate into the difference between the temporal logic of production and consumption. As one florist noted:

*"Many consumers do not give water to the arrangements which would keep them good for longer. We put Floral Life in the water and Crown & Glory for flowers that are put in foam which make them last 4 to 5 days before they are done." He seems to understand my rather confused and upset facial expression wondering why people would spent so much money on flowers every week without caring for them.*
*Soberly and with a certain severity in his tone he continues, "flowers that do not last longer are somehow more prestigious to have. People are less interested in flowers that last long"*

- *Field Note in Seasons: A Floral Design Studio, Hell's Kitchen 02/12/2023*

Workers on flower plantations try to elongate the time a flower stays fresh and aesthetically pleasing, while clients in florist stores consider its ephemeral temporality prestigious. If, at the site of consumption, the harmful consequences of toxicity seem like a

distant abstract notion, this is closely bound to a privileged Western life that is committed to keeping pollution or contamination 'out' and geared towards maintaining a linear temporality of progress that keeps notions of impurity confined to 'some time, somewhere else' (Adams 1998). Toxic waste, contamination or pollution is perceived as spatially and temporally distant from our everyday lives. However, as previously noted, imaginary borders do not create a 'safe space' from toxic matter. The question thus becomes, how to bring 'home' or make the notion of toxic contamination 'real' in the spaces that reproduce toxic timescapes in the first place. A focus on transcorporeal temporalities exposes the fallibility of any sort of protection and connects the consequences of our actions to the immediacy of our own flesh.

Again, the contradiction of maintaining a 'safe-zone' in some areas by displacing toxic pollution to others, is reflected in legal and international frameworks of importing countries that fail to address pesticides related to the flower industry. The control of pesticides on EU imports of cut flowers is only mentioned in Council Regulation 316/68 of 1968, which establishes quality standards for ornamental flowers (Pereira et al. 2021). The standards apply to 'fresh cut flowers and flower buds suitable for bouquets or for ornamental purposes'[1] and include qualitative criteria such as the development of the flower bud, absence of parasites and percentage of imperfections. In regards to pesticides the regulation states that flowers should be 'free of residues of pesticides and other extraneous matter affecting the appearance'[2]. Also the US does not set limits for the use of pesticides on flower buds. In their 'Cut Flower and Greenery Import Manual' the US Department of Agriculture established floral standards according to the absence of pathogens and pests (Attavian, s. d., 28) and based on the visual appearance of flowers. In addition, they recommend the use of gloves

[1] Council Regulation (EEC) 316/68 of 12 March 1968 fixing quality standards for fresh cut flowers and fresh ornamental foliage [1968] OJ L71,21.3.1968.
[2] Council Regulation (EEC) 316/68 of 12 March 1968 fixing quality standards for fresh cut flowers and fresh ornamental foliage [1968] OJ L71,21.3.1968

during inspection to protect the inspector from pesticides (Attavian, s. d., 25). Likewise, in Japan, there are no MRL's in their import regulations concerning the cut flower trade (Pereira et al. 2021). The belief in spatially defined contamination free zones reproduced by the absence of pesticide regulations in the legal structure and the compartmentalised production of scientific knowledge, is exposed through a focus on the temporal continuity of toxic matter. Through the framework of a timescape different locations are connected through time and space which shows that no place in the past, present or future is safe from toxic pollution.

### *5.1.3 Transgression Three: Possible Futures of Toxicity and a Politics of Long-Term Responsibility in IR*

*"I do not want to discourage them because it is hard work, and people have romanticised the idea of working with flowers. But for me it is southing because you see flowers live and die. It gets you out of your head."*

*"Where do they go after they die?"*

*"In the bin" was his simple answer.*

- *Field Note in Seasons: A Floral Design Studio, Hell's Kitchen 02/12/2023*

I had previously never taught of flowers dying in the florist store before they were sold. I imagined them perishing in a vase on someone's dinner table, to then be thrown in the bin and the vase water in the sink. The idea of flowers dying, made me wonder what happened to the other entangled matter. At this point, the floral body and the vase water also contained toxic matter. In contrast to the organic matter of the flower that easily decomposes into particles, toxicity persist the ravages of time and space. Also the vase water poses a heightened risk to aquatic and terrestrial life as chemicals dissolved in vase preservatives

easily find their way to soil and water bodies before being treated (Singh, Sharma, and Sahare 2022; Menegaes et al. 2020). Toxic matter ends up in a multitude of spaces and transgresses different bodies of water, soil and air. As such, the third transgression is one between toxic matter and all the different futures it renders possible.

The third transcorporeal intra-action makes time different, in the sense that it makes toxic time. The moment toxic matter 'leaks' beyond the body of the flower, a plethora of futures become possible propagating toxicity. The material accumulation of temporality in the floriculture industry renders time itself toxic as the intra-actions that make time are based on toxic matter. The future, in this sense, does not merely flow out of the present, rather, the future and the past are unfolding participants in continuous becoming-s of the world or 'worldings of materiality' (Barad 2007). Or in this case 'worldings of toxicity', in which past, present and future collapse into a continuous perpetuation of a permanently polluted world.

The spatial and temporal materialisation of difference that is created in the 'past' and 'present' transgressions and maintained by legal structures, also disintegrates in the future. The impact of toxicity is unevenly distributed forming a hierarchisation of (non)-human bodies showcased by the adverse consequences in the site of production as opposed to the site of consumption. However, as the making of time entails intra-actions of bodies propagating toxic futures, also the hierarchy of bodies collapses onto itself. All bodies across all times and spaces come in contact with toxic matter.

The sense of urgency regarding the pollution and contamination of the planet has spiked in recent years, urging governments to undertake action. However, in the 'green deals' that promise to create a more sustainable society to ensure 'our safe future', there is no consideration for the materialisation of temporalities. Both the US policy proposal, the Green New Deal and the European Green Deal that aims to make Europe a carbon free continent by 2050, are embedded in discourses of economic growth and becoming a competitive member

in the market economy (Vela Almeida et al. 2023). Ursula von der Leyen, head of the European Commission, stated in her opening speech of the European Parliament Plenary Session in 2019 that 'The European Green Deal is our new growth strategy. It will help us cut emissions while creating jobs' (Ursula 2019, 7). Both deals consist of building critical infrastructure to become more sustainable, invest in renewable energy technologies and accelerate the green digital transition (Bloomfield and Steward 2020). However, there is no regards as to where the materials that are necessary to achieve the goals of the green deal will come from and under what conditions the people extracting these materials will work under. By extension, the materialisation of temporality is absent in both documents which overlooks the fact that also buildings, technologies and digital infrastructure pollute in the long-term. The impact of this pollution might not immediately affect the US or the EU, but its symptoms will materialise 'some time, somewhere else' and contribute to the materialisation of toxic futures globally. As such, the green deals geared towards the creation of a 'cleaner' future, reproduce colonial and neo-colonial power politics (Vela Almeida et al. 2023). As discussed earlier, also the compartmentalised production of scientific knowledge sustains the legitimacy of the deals by isolating spaces in time. Solely focusing on creating a more sustainable future in EU or in the US fails to acknowledge the temporal interconnectedness of all pasts, presents and futures. The EU Green Deal for example, proclaims that countries can implement 'policies that save lives, cut costs and protect prosperity' (The European Green Deal - European Commission 2021). Such discourses obscure other lives being taken, other temporalities being negatively impacted and other spaces being deteriorated. The construction of the collective imaginary that 'safe' places from pollution and contamination are 'in the making' in some spaces without critical engagement with the mattering of difference that the deals entail merely leads to a reproduction of the status quo: a permanently polluted world.

## 6. Conclusion: The Toxic Sublime

If studied at all, time in IR has traditionally been understood as a linear process which defined progress as a constant movement forward in time. While novel narratives of time have recently emerged in research regarding the intersection of war, temporality and toxicity that argue for the consideration of multi-temporal, multi-spatial and multi-species accounts within IR, such studies have rarely left the context of war and have studied toxicity merely as a result of conflict. It is against this backdrop that this research thesis has broadened the conceptualisation of time within IR by analysing toxic materiality outside of the 'event' of war through a case study of the flower industry. By asking 'How does the temporal relation between the floral, human and environmental bodies connected through toxic matter in the floriculture industry recentre the question of time in IR?' I argued that the focus on everyday/un-eventful toxic matter highlights the role of IR in the materialisation of temporalities and by extension the mattering of difference. This recentres the question of time within IR in several ways. Firstly, it encourages the discipline to broaden its temporal imagination and acknowledge more-than-human non-linear accounts of time. Secondly, it draws attention to the role IR plays in reproducing colonial legacies by determining which lives and deaths come to matter rendering certain futures (im)possible. Lastly, the consideration of alternative experiences of time opens up a space for a politics of responsibility attentive to the long-term material consequences of actions.

Building on new-materialist and post-humanist theory, I developed a transcorporeal toxic timescape as theoretical framework. Viewing time as a transcorporeal entity enabled a dynamic analysis of spatial and temporal bodies that intra-act in a process of materialisation. In this sense, I analysed both toxicity's capacity to transform time and permeate space, and its ability to *make time differently*. Through encounters of toxic matter with floral, human, and environmental bodies, seemingly fixed boundaries collapse and new separations and

differences emerge. With the framework of toxic time and space as relational and intertwined, and, temporality as a transcorporeal entity, I captured the process of the *mattering of difference* in the flower industry. This brings a novel perspective to time in IR by understanding time as something that is *made* and *reproduced* in which IR plays an active role. Based on ethnographic fieldwork in NYC florist stores and secondary data from a content analysis of scientific research on the effects of pesticides, I learned to think with flowers through time and space which unravelled a complex entangled structure whose temporal, spatial and corporeal crossovers that contract, expand and intra-act continuously make and unmake different worlds

In the empirical analysis, I followed the transgressions of toxic matter through floral, human and environmental bodies in the past, present and future. As such, I constructed a transcorporeal toxic timescape of the floriculture industry in which the *mattering of difference* through legal and international structures became visible.

In the first transgressions analysed in the 'past' processes of production, I have shown how the capitalist consumption society that demands the infinite availability of products causes the prioritisation of some temporalities over others. In the case of the floriculture industry, it is the altered temporality of the fresh-cut flower that prevails over the temporality of the environment and floriculturist. The particular temporal and spatial characteristics of toxicants reconfigure temporalities shaping a world of difference connected through toxicants that persist alongside passing temporalities. This process of *mattering of difference* is maintained by regulations of the aesthetical quality standards and absence of pests in the ornamental flower industry set by importing countries which increases the incentives to use chemical fertilisers, pesticides and herbicides in exporting countries.

In the 'present' the trancorporeal interaction between materiality and temporality in the flower stores was less visible/feelable. Firstly, the compartmentalisation of scientific research

isolates bodies in time and space which disconnects spaces of production and consumption, and constructs some spaces as pollution 'free' zones in contrast to others. By analysing scientific results from a temporal perspective, I showed how the materialisation of temporality plays a role across seemingly fragmented findings. Secondly, I revealed how the considered 'absence' of toxic matter in the present, draws attention to the influence of space over time encoded in colonial mappings of the distribution of toxicity. Here again, I discussed how the contradiction of maintaining a 'safe-zone' in some areas by displacing toxic pollution to others, is reflected in legal and international frameworks of importing countries that fail to address pesticides related to the flower industry.

The third transgression is one between toxic matter and all the futures it renders possible. The material accumulation of temporality in the floriculture industry renders time itself toxic. Critically engaging with the US Green New Deal and the EU Green Deal, I demonstrated that with no regards to the mattering of difference that the matter necessary for building the required digital or critical infrastructure and develop new 'green' technologies maintains, the 'sustainable' futures will be founded on other polluted futures. This contradiction is further legitimised by scientific research that isolates the former from the later futures. As such, the Green Deals further reproduce colonial legacies and maintain the status quo: a permanently polluted world.

Overall, the thesis has two main contributions to IR; (i) the role of IR in *the mattering of difference* and (ii) possibilities to reimagine long-term responsability. Firstly, international relations are actively a part of 'a process of materialisation that enacts a reconfiguration of the world in which differences come to matter'(Aradau 2010, 494). Within this materiality the blueprints of global power dynamics are engraved in seemingly harmless everyday practices such as consuming fresh-cut flowers. These structures not only define space, but also manage time and continuously reproduce a permanently polluted world. Also the materialisation of

temporalities in the flower industry is maintained by international legal structures controlling the aesthetic criteria to which flowers need to adhere in order to enter the global market economy. As such, the discipline of international relations cannot neglect its participation in the making of toxic time that impacts entities across imaginary boundaries. Rather than drawing attention to individual consumer choices, I call on the legal structures and international systems that manage the *mattering of difference* to take up responsibility. Secondly, realising the role of IR in the intoxication of the planet creates the possibility to intervene responsibly in the temporal and spatial entanglements it maintains. However, intervening responsibly does not mean 'fixing past mistakes' as the past is equally the present and the future, but rather entails the incorporation of a politics that is attentive to the long-term material consequences of actions. To become a 'future oriented enterprise' (Berenskoetter 2011), IR needs to hold into account the non-extraordinary, un-eventful materialisation of temporality as it makes time different and renders certain future possible.

Based on my findings, I propose that viewing time as a non-linear entity developing along multiple narratives that make and un-make worlds, allows for a more holistic understanding of the consequences of our actions. Every action will entail a chain reaction of intra-actions between material and temporal bodies that will influence the past, present and future coexisting in the making of time. By recognising the 'connectivity of phenomena on different scales' (Barad 2007, 247) and understanding how these phenomena are made through one another, creates the possibility to look past the compartmentalisation of scientific research and IR decision-making processes focused on the a narrow understanding of the present. The awareness of the participation of IR in co-laboured temporalities opens up a space for intervening responsibly in the entanglements of which we are a part of and re-imagining long-term consequences of actions through materiality. As the matter of future is already being made in the present and the past, the question which matter we would like the

future to be constituted of is essential. Thus, thinking through toxic temporality urges us to think a different kind of politics of responsibility capable to dilute the fetishization of the present accounting for a multiplicity of human and non-human temporalities. The present belongs at the same time to the past and the future and is not just ours.

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