

Gendering Toxic Contamination: Toxic Risks, Bodies, and Pregnancies in Gold Mining and Coca Farming Communities in the Bajo Cauca Region

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Abstract: This paper investigates women's everyday reproductive struggles in contexts of toxic contamination and the tensions emerging between toxic exposure and care in women's experiences of motherhood. While scientific framings of reproductive disruptions understand social identities as pre-existing the experience of toxic risks, in this paper I argue that, in toxic territories, the categories of "contaminating" and "contaminated" actors interact with other categories of identity, such as gender and race, shaping social relations. Drawing on 13 months of ethnographic fieldwork conducted in the Bajo Cauca region among gold mining and coca farming communities, I investigate the everyday processes of gendered subject formation that unfold in toxic territories and the emergence of "faulty" gendered identities for rural mothers. Building on scholarship in feminist geography and Latin American feminist science and technology studies, I argue that ineffective forms of integration of gender in the institutional debate on toxic contamination reproduce, rather than challenge, the invisibility of rural women before the state.

Resumen: Este artículo analiza los desafíos reproductivos de las mujeres en contextos de contaminación tóxica y las tensiones que emergen entre la exposición tóxica y las prácticas de cuidado en sus experiencias de maternidad. Mientras los discursos científicos sobre contaminación conceptualizan las identidades sociales como preexistentes a la experiencia de riesgos tóxicos, en este artículo argumento que las categorías de actores sociales "contaminados" y "que contaminan" interactúan con otras categorías de identidad como el género y la raza, influenciando las relaciones sociales. Con base en 13 meses de trabajo de campo etnográfico en la subregión del Bajo Cauca con comunidades cocaleras y mineras, investigo los procesos cotidianos de formación de subjetividades de género que se desarrollan en territorios tóxicos y la construcción de una identidad "defectuosa" impuesta a las madres rurales. El artículo contribuye a los debates en la geografía feminista y los estudios feministas latinoamericanos de Ciencia y Tecnología, argumentando que las formas en las que el género ha sido integrado en el debate institucional sobre contaminación tóxica reproduce, en vez de desafiar, la invisibilidad de las mujeres rurales frente al estado.

Keywords: gender, toxic contamination, reproduction, pregnancy, glyphosate, mercury

Introduction

The cover of the United Nations Environment Programme–International Pollutants Elimination Network report, “Women, Chemicals, and the SDGs” (UNEP–IPEN 2021), shows a black woman carrying a baby on her back while working in a field where they are both exposed to toxic agrochemicals. This picture is representative of an increasingly strong institutional narrative that identifies women from low-income, racialised, and marginalised communities as disproportionately affected by toxic contamination. Since the adoption of the Strategic Approach to International Chemicals Management in 2006, this narrative pervades technical documents on environmental health (WHO 2009, 2010) and underpins reproductive environmental health frameworks (Woodruff et al. 2008). In a climate of anxious environmental gender mainstreaming (Arora-Jonsson 2014), the emergence of epidemiological evidence on the correlation between toxic contamination and women’s reproductive health locates women, once again, at the very centre of environmental policy making, highlighting the need to understand “the significant linkages between gender and chemicals” (UNDP 2011:3) as a policy priority. As “one lynchpin between environmental pollution and community wellness” (Gürr 2011:724), women’s reproductive bodies become a crucial policy target.

Yet, in marginalised, racialised, and impoverished geographies affected by toxic contamination, this institutional focus not only fails to challenge, but also reinforces women’s invisibility before the state and environmental policy makers. In this paper, I draw on ethnographic fieldwork in the Bajo Cauca region (North-western Colombia) to argue that the institutional understandings of the gendered impacts of toxic contamination need to be complemented by looking at the lived experiences of women’s everyday reproductive struggles. In the context of an impoverished and marginalised geography where limited livelihood strategies are available to rural women, technoscientific framings of toxic contamination co-produce them as faulty mothers whose caring practices fail to succeed in keeping their household members safe. Furthermore, by framing reproductive disruptions only in biological terms, risk-issue framings fail to recognise the challenges that toxic contamination elicits in collective social and cultural reproductive practices (Di Chiro 2008; Hoover 2018). Drawing on the reproductive life stories of women from the Bajo Cauca region, I argue that experiences of pregnancy and pregnancy loss in contaminated territories can be understood as a critical standpoint (Harding 1991) to discuss processes of subject formation that unfold in toxic territories. In this paper, I look at the ways in which, in extractivist and contaminated geographies, the experience of pregnancy co-produces conflicting gendered responsibilities in relation to the household, the community, and the environment, eliciting challenges to processes of individual and collective identity making and ambiguous normative ideas about what being a good mother (and a good woman) entails.

This work contributes to debates on gender and environmental changes in feminist geography by untangling the complex micro-dynamics of everyday processes of subject formation that unfold from the specific “geopolitical positionality” (Hofmann and Duarte 2021:40) of contaminated geographies. Feminist geographers have placed gender and race at the centre of debates on toxic

contamination, conceptualising social categories of identity as a determinant of structural environmental inequalities (Nixon 2011; Pulido 2017) and looking at processes of subject formation taking place in extractivist and toxic geographies (Frederiksen and Himley 2020; Hofmann and Duarte 2021; Ureta et al. 2018). Building on this work and engaging with Latin American feminist science and technology studies, I argue that gendering toxic contamination requires further understanding of the interplay between toxic risks and everyday processes of subject formation. Drawing on my ethnographic work with coca farming and gold mining mothers in the Bajo Cauca region, I engage with the standpoint of pregnancy as a ground for processes of identity formation. I argue that, by disrupting women's reproductive practices, toxic contamination informs processes of identity making and is co-productive of ambivalent narratives of motherhood. My ethnographic focus on women's reproductive life stories complements macro-structural analyses of toxic contamination by engaging with subjective, everyday processes of meaning making that unfold within gendered and racialised structures of (toxic) power.

The understanding of toxic contamination as co-productive and, at the same time, disruptive of women's social identities beyond the biomedical level also has significant implications for environmental policy makers. First, it proves the conceptualisation of reproductive disruptions limited to the biological body as insufficient, and calls for recognising the disruptions posed by toxic contamination to processes of social and cultural reproduction (Di Chiro 2008; Hoover 2018). Moreover, it demonstrates the importance of promoting the integration of women in environmental decision-making spaces, recentring them as economic and political actors.

The paper is organised into six sections. Following this introduction, I begin with a discussion of the debate on the interplay between gender and toxic contamination in feminist geography and of the role of reproductive experiences in processes of subject formation. I then present my research design, based on the investigation of toxic chemicals related to two value chains in the Bajo Cauca region, before discussing my methodological choices for the collection of women's reproductive life stories. In the fifth section, I draw on my ethnographic data to investigate the interplay between experience of contamination and everyday processes of subject formation. Finally, I conclude by looking at the implications of the conceptualisation of toxic risks and social identities as co-determined for environmental policy making.

Risks, Bodies and Pregnancies *The Co-Production of Gender and Toxic Contamination*

Important work in feminist geography locates gender at the centre of debates on toxic contamination. The feminist geographer Laura Pulido (2017:525) recognises the "devaluation" of nonwhite gendered bodies as a constitutive component of capitalist economic formations and a key criterion in the distribution of toxicity and environmental burdens. In the work of Colombian scholars such as Lara Veloza et al. (2015) and Hernández Bello et al. (2022), racialised and gendered forms of toxic labour exploitation are identified, for example, in the Colombian

floriculture industry. Beyond determining resource allocation (Nixon 2011; Pulido 2017), racialised and gendered power relations materialise in different ways on people's bodies, connecting different geopolitical spaces through the flow of toxins (Agard-Jones 2013). On the other hand, because of their disruptive social and environmental impacts, extractivist economies have been a particularly important object of research for feminist geographers as productive of gendered exclusion (Lahiri-Dutt 2012) and having an impact on social and sexual-affective relations (Cabrapan Duarte 2020; Cohen 2014; Hofmann and Duarte 2021). In Frederiksen and Himley's (2020:51) work on extractivist frontiers, subjectivities are directly "reworked" by mining and hydrocarbon industries in order to preserve specific relations of power that allow resource extraction. "Extractive subjectivities" (ibid.) therefore emerge from the relationship that local social actors establish with extractive industries and the toxic waste they produce (Ureta et al. 2018).

Importantly, critical Latin American feminist geographers such as Lorena Cabnal (2010) and Delmy Tania Cruz Hernández (2020a) have centralised women's bodies in contaminated geographies as meaningful subjects of research where the impacts of collective and individual processes of disruption overlap and become evident. Conceptualising women's bodies as located between individual and collective processes of reproduction, scholars of environmental reproductive justice highlight the collective challenges posed by environmental degradation to processes of social and cultural reproduction (Di Chiro 2008; Hoover 2018). Beyond its biomedical functions, the womb is here recognised as a geopolitical and symbolic space on which settler colonialist structures of power exercise different forms of violence (Zaragocin 2020), among which, toxic violence.

In this paper, I propose to complement macro-structural analyses of gender and race as key components of the structures of power that determine unjust distribution of environmental burdens and the emergence of environmental reproductive injustices, with a gaze on the micro-scale (Dyck 2005) of everyday processes of subject formation. Investigating the relationship of co-determination between toxic contamination and gendered subjectivities requires understanding social identities as performative, embodied, and in a process of constant change (Butler 1990), in their everyday relation with the material environment. The work of Farhana Sultana (2009) is crucial to the discussion on processes of subject formation, as it recognises subjectivities as always "spatialised" and "ecologised". In her foundational analysis, she illustrates the ways in which "water comes to play a role" (Sultana 2009:437) in processes of subject formation, by changing labour and social relations unfolding around water management practices. Similarly, the work conducted by Andrea Nightingale (2011:154) among forest communities in Nepal shows that social differences and inequalities "emerge through space" and the engagement of social actors with the material-environmental. This allows her to argue that the distinction between the symbolic and material fades away in the relation with the environment (Nightingale 2011). As a factor that changes this relationship, toxic contamination can therefore be recognised as a key determinant of processes of subject formation. The relations that emerge at the interface between the subject and a toxic environment is defined by Alex

Nading (2020:211) as “toxic worlding”: the active and embodied engagement where subjects are “affected” by toxins and learn to “affect in return” (ibid.).

The analysis of the gender-environment nexus proposed by these scholars can be taken further by engaging with feminist science and technology studies and, in particular, their development in Latin America (Navas 2023; Olarte-Sierra 2013, 2022; Pinto-García 2019; Rubiano-Galvis et al. 2023). Work by María Fernanda Olarte-Sierra (2022) suggests that no such thing as a neutral scientific gaze exists in isolation from the risk-issue framings that describe such materiality. She understands technoscientific categories of analysis as performing an action of “world making” (Olarte-Sierra 2022:25), by producing scientific objects (in this context “toxic contamination”) and, at the same time, social categories of identity. In particular, the context of the post-Peace Agreement in Colombia is characterised, in the work of Lina Pinto-García (2019), by the emergence of technoscientific visions of the social reality that reproduce specific imaginaries of war and peace. In particular, “biomedicine, public health, and warfare” (Pinto-García 2019:98) are irredeemably entangled. Focusing specifically on the technoscientific framing of mercury contamination, Rubiano-Galvis et al. (2023) argue that it is inherently linked with the co-production of marginalised social actors in the Colombian mining landscape as lacking technical knowledge and performing criminal practices. The object (mercury contamination) and subject (criminalised informal miners) of this risk-issue framing (Rubiano-Galvis et al. 2023) emerge as interrelated and co-determined (Olarte-Sierra 2022). Importantly, the labels of “contaminating” and “contaminated” actors emerge as new social categories of identity that intersect with gendered and racialised categories. This understanding of scientific expertise as “world maker” (Olarte-Sierra 2022:25) calls not only to consider the interaction of co-determination between social actors and experiences of toxic contamination, but also to engage with technoscientific framings of “toxic risks” as productive of social reality. For example, in her work on the victims of pesticides in banana plantations in Nicaragua, Navas (2023) draws on the concept of “undone science” to argue women’s social invisibility is reproduced by a scientific discourse focused solely on the impacts of toxic contaminants on male bodies.

Toxic contamination is thus co-productive of social subjectivities across two important dimensions. First, different social actors experience toxic disruptions and make sense of them through their experiential embodied and situated knowledge (Harding 1991). Second, this knowledge interacts with technoscientific risk-issue framings which shape state-citizens and other social relations in contexts of toxic contamination, assigning responsibilities and prescribing appropriate precautionary behaviours (Mansfield 2012). In particular, ethnographic engagement with women’s experiences of risks allows us to recognise these framings also as productive of normative ideas of motherhood. Nightingale’s (2011) claim that symbolic and material social differences overlap in processes of subject formation can therefore be taken further by examining the relationship between the material and symbolic changes elicited by toxic contamination (Olarte-Sierra 2022).

Pregnancy and Pregnancy Loss as the Ground to Identitarian Narratives

What role does reproduction play in this process of co-determination, and how do reproductive disruptions frame processes of subject formation? In order to understand the interplay between toxic contamination, reproductive disruptions, and processes of subject formation, reproduction needs to be recognised both as a specific form of environmental engagement as well as a process of subject formation. Several feminist geographers have understood reproductive practices as always located in space by engaging with the concept of “reproductive geographies” (Calkin et al. 2022). Importantly, reproductive justice scholars have challenged reductionist conceptualisation of reproduction as understood solely in biomedical terms. In particular, Giovanna Di Chiro’s (2008) research has been critical to the debate on environmental justice, as it recognises processes of biological, cultural, and social reproduction as overlapping and inherently related to a healthy environment. Her work marks, in fact, a crucial pathway to identifying the role of the environment as underpinning processes of individual and collective reproduction (ibid.). Drawing on ethnographic research conducted in a Mohawk American Indian community located on the US/Canadian border, Elizabeth Hoover (2018) added to this work and proposes the framework of environmental reproductive justice. This framework recognises the environment as a provider of material resources that are fundamental to processes of social reproduction; of the setting where livelihood strategies and cultural practices can unfold and be transmitted to the next generation (ibid.); and where cultural projects of self-determination can be imagined and enacted. Reproductive practices and struggles therefore imply a specific form of “environmental engagement” (Eden 2016), as they are both shaped by, and shape, the environment in material, symbolic, and cultural ways. Just as access to “a healthy and safe environment” is conceptualised as a crucial reproductive right (Ross and Solinger 2017), toxic disruptions also need to be understood in light of the multivarious roles that the environment plays for individual and collective processes of reproduction.

Located between the symbolic and the material (Nightingale 2011), reproductive practices are important grounds where meaning-making discourses and related processes of subject formation unfold. In the research conducted by the feminist activist and scholar Angela Davis (2013) on modern motherhood, ideas about what being a “good mother” entails in a specific socio-economic historical context are found to shape women’s identities, even though these meanings are also constantly challenged and resisted (ibid.). In particular, socio-cultural processes of socialisation spanning from institutional knowledge sharing to informal learning from other family members and women are recognised as particularly important cultural forces that fix specific ideas of womanhood. The experience of pregnancy is, in itself, “good to think with” as a “site of struggle over the construction of identity” (Layne 2003:26). In her ethnographic investigation of pregnancy loss support groups in the US, in fact, Linda Layne casts reproductive narratives and practices as a “lens” (ibid.) into collective and individual meaning making, and therefore as co-productive of social roles and identities. Biomedical discourses framing women as in complete control over their pregnancies, for

example, impose a set of blaming and self-blaming narratives that shape women's perceptions of self-worth (ibid.). Similarly, in her analysis of rising anxieties over climate change and the simultaneous widespread availability of assisted fertility technologies in the UK, Katharine Dow (2016) argues that people's reproductive choices are receptive of, and at the same time, frame the meanings of being a good citizen (and a good woman) during a time of ecological crisis. In the context of the Colombian conflict, it is also important to recognise that the processes of socialisation into motherhood and women's parenting experiences are located in the context of consistent "reproductive violence" exercised by the Colombian state and other armed actors (Sanchez Parra 2023).

In our case study of gendered framings of toxic contamination, the co-production of women as faulty mothers can be understood across different dimensions. First, feminist scholars of science, like Sandra Harding (1991), have recognised scientific risk-issue framings as co-productive of social inequality at the epistemological level. In fact, by establishing a given source of knowledge as valid and objective, these framings are labelling other bodies of knowledge as unworthy of entering the public debate. Second, in the work of feminist geographers of health, like Becky Mansfield (2012), the production of ambiguous prescriptions and precautionary behaviours emerges as a problematic form of reproductive governance that transforms collective socio-political issues into a set of individual responsibilities. In the case of women from low-income and marginalised social sectors, these prescriptions of precautionary behaviours clash with the social obligation of providing for their children, as the majority of economic activities available involve exposure to toxic chemicals, trapping these social actors in ambiguous ideas of motherhood. Third, scholars of disability studies such as Stacy Alaimo (2010) and Sunaura Taylor (2018) argue the assumption that given bodies are biomedically defective and toxically impaired leads to the construction of defective and less-than-human subjectivities. Toxic disruptions to biological processes of reproduction therefore also have implications for women's social identities as narratives of blame and self-blames unfold when pregnancies result in unsuccessful reproductive outcomes.

The Social Life of Mercury and Glyphosate in the Bajo Cauca Region

In this paper, I draw on the ethnographic analysis of the social life (Appadurai 1986) of two toxic contaminants, mercury and glyphosate, in the Bajo Cauca region in Northwestern Colombia. This is a multi-ethnic territory where Indigenous, Afro Colombian, and mestizo communities have coexisted since colonial times and whose history has been significantly shaped, since the 1970s, by the presence of paramilitary structures¹ and a protracted armed conflict, with peaks of violence and forced displacement between 2016 and 2018 (IPC 2021). Mercury and glyphosate are essential components of the recent socio-political history of this territory. Between 2000 and 2015, the Bajo Cauca region was strongly targeted by the policy of aerial fumigations of coca fields within the context of Plan Colombia, which entailed the forced eradication of illegal crops. The widespread

spraying of glyphosate and other surfactants on coca fields has been harshly criticised as a highly contaminating practice which generated substantial health impacts for coca farming communities (Ordoñez et al. 2021). In 2015, following a study conducted by the International Agency for Research on Cancer (IARC 2017), which indicated the possible carcinogenic effects of glyphosate exposure, the application of a precautionary principle led to suspending this policy. However, practices of manual eradication, which often imply the use of glyphosate (PECAT), were still implemented after 2015. Epidemiological studies found glyphosate to lead to several health issues, particularly related to women's reproductive health and cancer, and aerial aspersions have also been associated with miscarriages (Ordoñez et al. 2021). Moreover, beyond the toxic impacts of the War on Drugs, coca farming itself also requires intensive use of pesticides, fungicides, chemical fertilisers, and herbicides, as does the process of transformation of coca leaves into coca paste (Acero et al. 2023).

Meanwhile, mercury is widely used in artisanal gold mining to improve the efficiency of the extraction process (Gibb and O'Leary 2014). Mercury is a highly contaminant metal that, once evaporated, gets deposited in the water and can have significant health impacts on humans through fish and water consumption or direct inhalation during the burning of the amalgam. Rubiano-Galvis et al. (2023) trace the history of mercury in Latin America as directly correlated to the colonial establishment of European extractivist practices, later employed by local informal miners. In the Bajo Cauca region, this technique was firstly implemented in the 1970s by the legal company *Mineros SA* (formerly *Pato Gold Mines*). Since the implementation of Law 1658 of 2013, which forbids mercury in gold mining, the company abandoned this technique, while a variety of medium- to small-scale miners in the Nechí river basin continue to use mercury. Like glyphosate, this chemical can significantly impact women's reproductive health and has been found to lead to infertility, neurotoxicity, and foetal malformations (Wang et al. 2016). Studies conducted in the region found elevated levels of mercury in fish (Cadavid-Muñoz et al. 2022) and in maternal milk (Molina et al. 2018).

Tracing the social lives of these contaminants in the Bajo Cauca region allows the establishment of a comparison between contradictory yet complementary institutional narratives on toxic contamination. Glyphosate, in fact, has been historically framed as a "safe" chemical by different Colombian governments and used against criminalised social actors (coca farmers) in the context of the War on Drugs. Mercury, on the other hand, is framed as extremely harmful in institutional narratives, and its usage among informal miners is criminalised and restricted by the Colombian state (Rubiano-Galvis et al. 2023). Paradoxically, both sources of contamination overlap in the bodies of marginalised social actors inhabiting the Bajo Cauca region, where coca farming and gold mining represent complementary livelihood strategies according to the oscillations in the international prices for gold and coca paste.

Methods

To reconstruct the social life of these chemicals in the Bajo Cauca region and investigate women's everyday reproductive struggles, I conducted 13 months of

ethnographic fieldwork in the municipalities of Nechí, Tarazá, El Bagre, and Cacéres, in *veredas* selected because of their involvement in coca farming and/or gold mining activities. I grounded my research on a collaborative ethnographic relationship with farmers' organisations, fishermen's organisations, gold mining collectives, and several *Juntas de Acción Comunal*. Iterative negotiations with local grassroots organisations about the purpose and contribution of my research to the activist work they conduct have been essential components of the research process. I conducted 14 social and body cartography workshops, two of which were in Indigenous territories, and one in an Afro-Colombian territory with a total of 164 participants (134 women and 30 men). I also interviewed 68 of the female participants who took part in these workshops (see Table 1). These data were then complemented and triangulated with semi-structured interviews conducted with other female (16) and male (28) social leaders. In order to investigate institutional discourses on toxic contamination, and given the role that technoscientific risk-issue framings play in co-producing social roles and state-citizen relations (Olarte-Sierra 2022; Rubiano-Galvis et al. 2023), I also interviewed representatives of local and regional environmental and medical institutions (15) and reviewed policy documents produced by local and national institutions. I observed work in gold mines and coca farms, as well as several internal meetings held by the organisations involved in this project, but ongoing armed conflict limited the possibility to conduct more extensive ethnographic observation in these spaces.

Centralising women's experiences of contamination in the research process entailed adopting an open structure for the semi-structured interviews and focus group discussions that let the ambiguity, contradictions, and conflicting narratives around toxic contamination emerge in women's accounts of their experiences. These interviews focused on the relations between women's bodies and the territory they inhabit through the lens of *cuerpo-territorio* (Cruz Hernández 2020a; Zaragocin and Caretta 2021), a research praxis rooted in communitarian experiences of territorial feminism (Cruz Hernández 2020b). In particular, I look at the intersectionality of women's experiences (Mohanty 1984) and engaging "with the complexity of feminised political subjectivities being formed and the contradictions and tensions in this process" (Motta 2013:49). Importantly, this meant engaging with forms of activism that do not necessarily fit within Western political

Table 1: List of workshops

Municipality	Number of workshops	Type of community	Toxic contaminant discussed
Nechí	3	Mixed group	Mercury
Tarazá	4	Mixed group	Glyphosate
	1	Indigenous community	
El Bagre	4	Mixed group	Mercury and glyphosate
	1	Afro-Colombian community	
Cacéres	1	Indigenous community	Mercury and glyphosate

theory and can be better understood as “living environmentalism” (Di Chiro 2008), based on everyday life experiences of environmental injustices.

Fieldwork activities followed an iterative approach. In the first step, social cartography workshops conducted with male and female social leaders were used to gain an initial understanding of people’s perceptions and experiences of contamination and their perspective on processes of environmental change. These activities were essential in the complex context of the armed conflict to create mutual trust with research participants. Body cartography (CMCTF 2017; Cruz Hernández and Bayón Jiménez 2022) and *pregnancy mapping*² activities were then used to facilitate discussions among female-only participants. The participants were then interviewed to reconstruct their reproductive life stories, focusing in particular on their experiences of pregnancy (and pregnancy loss).

Discussion

Women and Toxic Chemicals

While feminist scholarship on extractivist economies has often characterised women as “mere victims” (Hofmann and Duarte 2021:45) of extractivist industries, it is important to reintroduce complexity to this analysis. In the Bajo Cauca region, women actively engage with coca farming and gold mining activities and, through them, with toxic chemicals. Yet, they are located at the bottom end of both value chains. In this position, they are exposed to toxic chemicals while having very little control over decision-making processes related to chemical management. Historical processes of land and water grabbing that have been unfolding in the region since the late 1970s (IPC 2021) shape women’s relationships with the landscape. The concentration of paramilitary structures in the highlands, in points of strategic connection with the Paramillo region, supported the establishment of coca enclaves, pushing rural households dedicated to subsistence and cash crops to abandon these activities and begin coca farming, and later generating waves of forced displacement. Meanwhile, the lowlands along the Nechí river have been occupied by the gold mining company Mineros SA (formerly Pato Gold Mines), which holds a *Registro de Propiedad Privada*³ title over approximately 50,000 hectares along the Nechí river. Informal medium- and small-scale miners working with backhoes and dredges occupy the Nechí and Cauca⁴ river basins controlling the exploitation of gold deposits. The boom of informal mining activities and the expansion of legal mining had a significant impact on traditional artisanal mining practices in the river, such as gold panning, that used to represent an important source of livelihoods for rural women, and became increasingly less profitable because of the control exerted on gold deposits by dredge and backhoe owners (Lahiri-Dutt 2012). Other livelihood strategies that previously complemented the income of farming and gold panning, such as fishing, have been massively impacted by the destruction of the in-lake ecosystem, related to river contamination caused by the company Mineros SA and other mining actors, and the related reduced availability of fish. In this socio-economic context, several households alternate participation in coca farming and gold mining according to

the changing price of gold, implementation of forced eradication strategies, and the price of coca paste (Vélez-Torres and Chiavaroli [forthcoming](#)).

In coca enclosures, located mostly in the highlands, women are often employed as *guisas* to perform care work: cooking, cleaning the installations that host the coca collectors, or engaging, marginally, in coca collection activities. To perform these tasks, they have to move from the village centres to the highlands, often taking young children with them, whose food expenses are generally taken care of by the coca farm owners. Maria, one of the few female administrators of a two-hectare coca field in one of the *veredas* where I conducted fieldwork in El Bagre, where most coca farms are administered by men, remembers her first engagement with coca farming:

At the time, my baby was two months old. We went there ... I went with my husband not because he wanted to take me there, but because I said: "I am not going to stay in the village centre, I want to work as well." In the kitchen, it was just us women, I went there and cooked for all the coca collectors. I used to cook for 30, 40 coca collectors, at some point I even cooked for 50 men. In the kitchen we were all women. In the coca collection you had to be there with 30, 40 men and there were maybe only two, three women. (Interview, El Bagre)

On the contrary, the spraying of pesticides and fungicide, as well as the work of transformation of the coca leaf into coca paste, is mostly handled by men, as these tasks are considered riskier and require technical knowledge of chemicals. Despite this gendered distribution of work, some women resist the push towards the bottom of the value chain and, like Maria, learnt how to use toxic chemicals:

Yes, I learnt about that too ... I also learnt what is the exact quantity of chemical that needs to be used on the leaf for the process. I learnt about three main chemicals: cal, ammonium, and caustic soda. (Interview, El Bagre)

Maria argues that her knowledge of these chemicals now allows her to successfully administer her coca field such that, even if she is not directly involved in the processing of the coca leaf, she can now plan the investments required to set up and oversee the work of the chemist employed in her laboratory. Similarly, Teresa, a coca farmer from Tarazá, who entered the business as a *guisa* when she was only 12 years old and used to be called "*La Patrona*", because of her success, argues that she had to learn to "*quimiquiar*" coca leaves: "I worked with all the different plants, the pajarita, peruana blanca, peruana negra, I have processed all of them" (Interview, Tarazá). Located at the other end of the spectrum of women's involvement in coca farming, women who are only involved in care work usually know very little of the chemical process of transformation, are not familiar with the coca laboratory, and as will be discussed later, struggle to keep their children safe in this context.

Similarly, in gold mining activities, women are excluded from the more technified profitable extractive practices (Lahiri-Dutt [2012](#)). Some women are employed as *guisas* on the mining dredges, cooking and cleaning for the miners, while others work as *chatarreras* for backhoe owners breaking up stones and transporting them to the washing site. As noted in other ethnographic studies of artisanal

gold mining landscapes, women are rarely responsible for directly handling mercury and other chemicals (Chiavaroli and Vélez-Torres [forthcoming](#)). Some female miners who practice gold panning do use mercury, but in their words, “just a little”. Still, even traditional gold panners are exposed to this chemical. In fact, when washing the residuals left by the backhoes in the *bateas* (a traditional wooden tool), the gold that is extracted through this process is often found as amalgamated with the mercury previously used by the backhoe workers.

In both coca farming and gold mining, lack of knowledge of toxic chemicals plays a role in excluding women from the most profitable activities. At the interface of cultural imaginaries, gender roles, and the gendered normalisation of risks (Camacho [2017](#)), the social relations that unfold around toxic chemicals characterise men as more in control and more knowledgeable of chemicals. This not only affects women by determining different routes of exposure, but also co-produces women as weaker socio-economic actors. Before the intensification of technified informal mining (Lahiri-Dutt [2012](#)), and the boom of backhoe mining practices in the region, some women used to work as independent artisanal miners, which represented an important source of independent income for rural women. As medium- and large-scale mining expands, women lose access to mining deposits and traditional livelihood strategies like gold panning are lost. The idea that men are better suited to managing the risks implied by the toxic landscape of the mine also frames the rules established by local armed groups, who often deny women access to the sites under their control. In some territories, this happens through implicit recommendations; in others, through explicit prohibitions. In several areas, local armed groups require men engaging in medium-scale technified mining to grant local women who used to work as gold panners a percentage of the gold they extract in order to compensate for their economic losses. This practice reinforces women’s reliance on the work of male miners and erodes their economic independence.

Contaminating Men, Contaminated Women

The categories of “contaminating” and “contaminated” actors intersect with gendered categories of identity. This relational process of subject formation emerges from everyday experiences of chemicals and the gendered distribution of work, as well as from strategic processes of identity making. Men are labelled as “contaminating” actors because they often act as carriers of chemicals into the household and women’s bodies. They are also portrayed as such by institutional criminalising discourses that impose this label on illegal miners (Rubiano-Galvis et al. [2023](#)) and coca farmers (Vélez-Torres and Chiavaroli [forthcoming](#)). Women’s identities as “contaminated” actors emerge both from everyday life experiences of exclusion from tasks and decision-making processes related to chemical management, while also being employed strategically to advance their struggles to access decision-making spaces (Hofmann and Duarte [2021](#)).

Women’s everyday experiences of toxic chemicals are strongly mediated by male members of their households. In coca farming and gold mining households, men often act as carriers of toxic risks. Maria recounts her experience of working

as a coca collector while carrying her second pregnancy in the dangerous space of the coca field. Her partner, also a coca collector, stored toxic pesticides in their bedroom:

On several occasions ... in the bedroom, they stored all these pesticides and poisons. But there are some poisons' smells that are very strong and, because of the pregnancy, I asked him to organise a room in another space to store these chemicals to not have anything like that in my bedroom to avoid affecting the pregnancy ... (Interview, El Bagre)

Similarly, women in (medium- to small-scale) gold mining households argue that men are in charge of burning the amalgam of gold and mercury, and they often do so on the kitchen stove, a practice that leads to the evaporation of mercury and the direct exposure of children, women, and other household members. Evaporated mercury breaks the kitchen stove and damages pots and other kitchen items, materialising in intrusive ways in the domestic space of miners' homes. Women worry that mercury can also be found on men's clothes—"You can find it at the bottom of the washing machine" (Focus group, Nechí)—and that children's clothes, being washed together, can also be contaminated. Some women required their partners to take a shower and leave their clothes outside before entering the house and touching their children. In the case of glyphosate, the experience of exposure is not mediated in the same way by the relationship with male household members, as this chemical was sprayed indiscriminately on coca farming communities by military planes. However, while women recognise the state as the main actor responsible for glyphosate fumigations, they also blame male household members for the decision to engage in coca farming. This both illustrates the imbalance of power in decision-making processes in some households, as well as a strategic use of discourse employed by woman to distance themselves from their partners' decision to engage in illegal activities. In the context of patronage-like relations with local institutions and international cooperation actors where disbursement of funds and inclusion in productive projects is often established through arbitrary decision-making processes, local women have learnt to "talk the talk" (Gutiérrez and Murphy 2022) that these actors want to hear. In particular, they have learnt that their engagement in illegal and contaminating activities does not fit well within the narratives of gendered victimhood (Dogra 2011; Pankhurst 2003) employed by international cooperation (USAID), UN agencies, and national NGOs working in the Colombia of the post-Peace Agreement (Gutiérrez and Murphy 2022).

Men act also as carriers of toxic contaminants through their bodies. Toxicity can in fact be passed from men to their partners through sexual intimacy and, in the case of pregnancy, from the mother's body to the foetus. Some research participants worry that if a child is conceived with a man who has been working for a long time in the mine or the coca field, the baby will carry an illness, even if the mother avoids exposure to toxic chemicals during pregnancy. Having intimate relationships with a chemist working in a coca laboratory or with a miner using large quantities of mercury is also considered a risk by traditional midwives:

This [contamination] works like with other bad habits: drugs, alcohol, and smoke. Sometimes the woman is very serious about her pregnancy, but if the man is vicious, it all gets to the baby. (Focus group, Cacéres)

In the case of the two Indigenous communities involved in this project, participation in gold mining activities and coca farming is marginal but increasingly less so, the risks of toxic exposure are not solely biological. As shown in the ethnographic work conducted by Sofia Zaragocin (2019) among indigenous Epera communities at the Colombian–Ecuadorian border, disruptions of biological processes of reproduction interplay with broader disruptions to culturally specific ways of living and processes of cultural reproduction. Fears related to the perception of decreased fertility due to toxic exposure interplay with fears of cultural loss.

Women recognise their bodies as the channel through which “contamination” reaches future generations and define themselves as “contaminated” particularly because, during pregnancy, toxins concentrate in their bodies:

When the moment came, I was already cooking for five of them [coca collectors]. But when I was about six, five months into the pregnancy, I started coughing and coughing. It was like an asphyxia, like an asthma, they sent me to Caucasia ... I cooked and coca was all around me, so you still had to breathe all these things that they poured on it. And they also washed the *bombas* in the same sink where I washed the plates. The doctors told me that the baby could also suffer from asthma because I was contaminated. (Interview, El Bagre)

In some of these narratives, fears of intoxication are tied to miners entering the territory as migrant workers. Even though understanding the relation between extractivism and sex work (Cabrapan Duarte 2020) exceeds the scope of this paper, women’s relations with toxic chemicals are often mediated by the space of willing or forced sexual intimacy with migrant foreigner miners. In the municipality of El Bagre, the expansion of the mining company generated a strong demand for male technical professionals and sexual workers. As stated in the memoir of a former engineer at the company (Gómez Vargas 2019), the wave of “development” generated by the expansion of legal mining activities also rippled over local sex houses, which, in the author’s words, “improved” (Gómez Vargas 2019:168) significantly. Amalia, a black woman from Nechí whose virginity was sold by her mother to a backhoe owner when she was 11, and who later decided to occasionally work as a sex worker to support her household, says that she disliked having miners as clients because “their hands were always black” (Interview, Nechí). She argued that sleeping with miners working on the dredges who are constantly exposed to the dirt of the river and other toxic substances carried more risks than those typically associated with sex work (i.e. contracting sexually transmitted infections and other diseases).

On the other hand, the identity of “contaminated” actors is also used strategically by women to gain space and visibility in local decision-making processes. While this paper is not concerned with analysing criminalising discourses that frame male miners and coca farmers as contaminating actors, it has been noted elsewhere (Vélez-Torres and Chiavaroli forthcoming) that masculinised

representations of the social actors involved in these activities contribute to the legitimisation of necropolitical state actions and military interventions (ibid.). Meanwhile, the increasingly dominant institutional representations of coca farming and gold mining as environmental problems contributes to women's framing of themselves as environmental victims to access decision-making spaces. The grievance of being "contaminated", and therefore the victims of environmental degradation, overlap with the demand for more inclusion in local decision-making spaces: "When they do these meetings, training and all that stuff, they should not be calling only male miners ... Why do they not call us all? The whole community?", says a female participant in a focus group discussion in Nechí held in December 2022, talking about training activities developed by the regional government of the Department of Antioquia, which only targeted male miners. As noted by Hofmann and Duarte (2021), institutional framings of toxic contamination as a "masculine" problem ultimately tend to co-produce women as weaker political subjects. For example, in Bajo Cauca, the representation of women as victims of an extractivist illegal economy excludes them from environmental decision-making spaces that target such issues at the community level and from technical spaces where knowledge of mining techniques is shared. The few development programmes that, in this geography, target women are mostly based on the provision of emergency goods, the funding of small-scale productive projects (e.g. "Mujeres de Oro" funded by USAID and Mineros SA), or generic programmes on gender equity that do not touch on issues of economic justice and do not provide technical training or knowledge ("Mujer-Es" funded by USAID and the Servicio Nacional de Aprendizaje–SENA).

Toxic Mothers, Faulty Mothers

Beyond shaping women's possibilities of engagement in local economic activities, toxic risks are embedded in the complex reality of what being a good mother entails in complex socio-ecological settings. A similar dynamic emerges in the work conducted by Juana Camacho (2017) in rural Northern Colombia where local farmers, who are the most at-risk actors, normalise exposure to toxic risks. In the Bajo Cauca region, being a good mother means being simultaneously *berraca* (strong and determined) enough to assume the risks implied in mining and coca farming, while also protecting the household members from such risks. Lina, who used to work as a *guisa* in a coca farm in Tarazá and now, after the glyphosate fumigations, is an unemployed mother, remembers when her child had an allergic reaction to glyphosate: "... and this poison fell on us when they were fumigating. He [the child] was there playing with a car and they sprayed him. I had to take him to the hospital because afterwards he could not breathe" (Interview, Tarazá). As shown by Lina's account, significant contradictions arise between the responsibility of caring for children's safety, while also having to provide for them by working in a coca field. A similar conflict was experienced by Maria, who relied on her 10-year-old child to help her set up the coca field she was to administer. While entering the coca business was prompted by Maria's aspirations to fund

her children's studies, it conversely requires her to seasonally count on her children's labour force.

This conflict emerges in even stronger terms during pregnancy. While no clear risk-management procedures to handle pregnancy are promoted by environmental and health organisations among rural communities, women are generally aware that they should avoid exposure to toxic chemicals during pregnancy. For example, female gold miners know that mining in the river should be avoided, as it can expose them to dangerous infections in the reproductive system, and handling mercury is acknowledged by female miners to be dangerous for both mother and baby. Yet, part of being a good mother requires navigating these risks to provide for one's child. Similarly, female coca farmers try to avoid contact with the coca plant while pregnant, as it is covered with pesticides and insecticides which can lead to skin rashes and other risky health issues. However, for single mothers in particular, it is often necessary to look for work in the coca fields. Maria recounts: "During this pregnancy that I had with her [her first daughter], I had to fumigate with toxic pesticides, I still had to do it all" (Interview, El Bagre). In this sense, navigating toxic risks is a structural component of the experience of being a mother in a contaminated territory. Institutional and informal attempts to raise awareness on precautionary measures, for example, through the organisation of campaigns funded by international development actors,⁵ the mining company, and local municipalities, hold little meaning (Mansfield 2012) and are often counter-productive, as they obscure women's everyday struggles in navigating a toxic environment. For example, local fishermen's organisations endeavour to spread awareness of the presence of mercury in fish. However, in the context of extreme food insecurity, women have not found these efforts relevant to their everyday life reality.

Beyond their inefficiency, scientific risk-issue framings impact women's processes of subject formation in their being co-productive of local women as faulty mothers. This is particularly evident in women's accounts of the experiences of pregnancy loss. Despite carrying their pregnancies in an extremely risky environment, where they are exposed to numerous sources of contamination, "women continue to bear the major burden for reproduction" (Layne 2001:41). Even when the conditions in which miscarriages take place point to a clear correlation with glyphosate exposure, like in the six cases of miscarriages collected during my fieldwork, women are still blamed and blame themselves. As no official and clear institutional recognition is given to the harmfulness of glyphosate exposure, women who experienced a pregnancy loss after aerial fumigations are left with the question of what they did wrong: "I did not hit myself, if I had hit myself, I would say so. But I did not fall, I did not hit myself" (Interview, Tarazá). In this sense, toxic risks are disruptive to women's social identities, and the experience of pregnancy loss results in the questioning of women's capacities as good mothers (Davis 2013).

These ideas inform women's relations with medical institutions. Carla, a young mestizo coca farmer who experienced a miscarriage during a glyphosate fumigation in the *corregimiento* of La Caucana in 2008, in the context of a *cocalero* strike, relates that, when she went to the local hospital in Taraza, she was explicitly

asked what she had done wrong. The doctor who visited her suspected that she was trying to perform a self-managed voluntary abortion. She recalls that:

They did not believe me until my husband confirmed that ... no doctor ... we really wanted this baby. For my husband, it would have been his first baby, so he was very excited about it [the pregnancy]. (Interview, Taraza)

In several interviews, women expressed the worry that something may have been wrong with their bellies for having been incapable of carrying out the pregnancy successfully or that they could have harmed the foetus because of the heavy work they performed and noncompliance with medical recommendations. In this context, rather than translating into a reason for collective mobilisation, pregnancy loss remains an individual experience that is experienced through the argument of the “defective” biomedical body. As argued by scholars in disability studies, the assumption that given bodies are “defective” often works as a ground from which less-than-human (Taylor 2018) subjectivities and weak forms of epistemic agency (Alaimo 2010), in need of scientific expertise to understand the changes that their bodies go through, emerge in public debates. In this sense, the institutional focus on biomedical reproductive disruptions in contaminated geographies co-produces and reinforces weak forms of gendered epistemic agency, devaluing women’s knowledge of their own bodies and calling for their experiences to be validated by biomedical knowledge.

Conclusions

In this paper, I discussed the pitfalls of current gender mainstreaming efforts based on the recognition of gender as a social determinant of disproportionate and differentiated vulnerability before toxic risks. I argued that, by overlooking the embeddedness of toxic risks in social relations and processes of subject formation and representing women solely as environmental victims, toxic risk-issue framings reproduce the invisibility of rural women before the state. Moreover, by keeping a narrow focus on processes of biological reproduction, scientific framings obscure other, more pervasive, forms of toxic disruption related to women’s socio-economic role and social identities. In this context, precautionary measures focused on women’s cognitive bias and changes in their individual behaviours are not only inefficient, but also counter-productive to women’s effective participation in environmental decision making, as they co-produce these social actors as weak epistemic subjects and defective mothers. I argued that, rather than assuming social identities as pre-existing toxic risks, gendering toxic contamination requires addressing everyday micro-processes of subject formation that unfold in toxic socio-ecological settings.

Lastly, recognising risk-issue framing as co-productive of social relations and identities should alert us to carefully consider what (gendered) subjectivities emerge at the interplay of people’s experiences of contamination and institutional narratives. In particular, it urges us to look at the ways in which risk-issue framings can perform symbolic violence against women from marginalised socio-economic groups, by considering their experiences and knowledge of reproductive

disruptions unworthy of entering the public debate. In the context of increasingly toxic and contaminated environments, gender-just environmental policy making requires us to urgently question the epistemological premises of science discourses as “an objective, separate sphere of knowledge making” (Alaimo 2010:65). On the contrary, engaging with toxic risks can be an “opportunity” (ibid.) to construct more democratic, inclusive, and participatory environmental decision-making processes based on the recognition of situated, embodied, and context-specific knowledge and relations with the environment.

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Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Endnotes

¹ Bloque Mineros de las AUC (Autodefensas Unidas de Colombia) and, after their demobilisation in 2006, the AGC (Autodefensas Gaitanistas de Colombia).

² A body cartography activity that builds on the Latin American tradition of *cuerpo-territorio* with a specific focus on the representation of the relationship between the pregnant body and the environment during pregnancy.

³ Register of Private Property (RPP 57011).

⁴ Areas nearby the Cauca river basin are mostly occupied by backhoes, while dredges work mostly in the Nechí river basin.

⁵ In this case, mostly USAID.

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