



# 'Matters' of Importance: Contamination in the Aftermath of the Fukushima Disaster

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*Contamination has been viewed as a form of invasion—an intrusion perpetrated by a group, a pernicious substance, or an unwanted agent. It is 'the Other' that has fascinated anthropologists for so long. We often assume that our current theory of knowledge about contamination is justified—although this current understanding fails to take into account the agency of contaminants themselves. Ideas about contamination throughout history have helped to fashion a particular dichotomy—a dualism where infection contrasts against wellbeing, where purity confronts impurity, and where 'pristine' nature opposes toxic landscapes. However, this binary understanding is often a double bind that does not reflect all of the nuances involved in contemporary problems, such as ecological disasters. For this reason, anthropologists have a lot to gain by focusing on matter – that is – to envision the agency of given materialities as a complementary topic to the analytical processes surrounding contamination. For instance, what actually happens if we consider that contamination "refuses" to recognize our political, social, and cultural boundaries? This article attempts to reconceive the notion of contamination by targeting the materiality of contaminants, particularly nuclear radioactivity in relation to the Fukushima nuclear disaster in Japan, in order to theorize a hybridized (i.e., non-binary) understanding of contamination—an understanding that better reflects the ways in which societies, governments, and individuals think about and interact with matter.*

## Introduction

Contamination has been a fascinating subject of study since well before the scientific discoveries of microbes, viruses, pathogens, tropical diseases, and radioactivity. Many cultures worldwide have used the idea of 'contamination,' generally represented by notions of uncleanness or impurity, before the days of modern science as a way to justify the social constructions of their societies. Indeed, contamination has been viewed as a form of invasion—an intrusion or violation perpetrated by a group (usually a minority), a pernicious substance, or an unwanted agent or thing. Contamination knows no borders and therefore threatens to subvert the order of things.

Paradoxically, it is often constituted through highlighting the very difference it threatens to subvert. It is the 'other' that has fascinated anthropologists for so long. For example, in the folk belief system of Japan, symbolic pollution has been used to explain the particularities of diverse hierarchical groups (Namihira, 1987). Specifically, this tradition has led to the ostracism of the *burakumin*, an important minority group whose members have long been socially marginalized due to their lineage ties with former outcasts who worked in industries considered to be impure, like meat processing and tanning (Aoki, 2009). Even as modern science changes the way that contamination is viewed, traditional ideas can

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continue to exert social influence in very real ways. It has been argued that the longstanding discrimination against the *burakumin* has functioned as a lever for Japanese majority groups to claim positions of relative prestige in terms of socially integrating into a modern Japan; specifically, the construct of contamination has enabled majority Japanese (i.e., urban as opposed to rural) to see themselves as clean, and to form a communal feeling that Aoki (2009) has called a “collective superiority, solidarity and togetherness” (p. 186).

Throughout history, the notion of contamination has been linked to dichotomies between pure and impure, clean and unclean, and normal and abnormal (Douglas, 2002). In such a context, we can easily ask how ideas about contamination shape social relations regarding acceptance, belonging, and exclusion. How does contamination facilitate these processes and how they are applied? Such inquiries may help to frame a given problem and enable us to construct multiple solutions (which may or may not be actually useful). Asking such questions might be putting the horse before the proverbial garbage cart, as it presupposes that we understand the notion of contamination in a way that sufficiently justifies our current theory of knowledge. However, we must ask ourselves if anthropologists actually *do* understand all of the nuances involved in formulating this idea. Do we truly understand how ‘contamination’ has affected—and continues to affect—the world around us?

This article will focus on contamination from a new vantage point in order to extirpate the concept from the dualistic double bind (i.e., clean versus dirty, pristine versus polluted) that tends to characterize past understandings. To do so, this paper targets the *materiality* of contaminants (i.e., the agency of the matter itself), a subject that has received significantly less attention than the semiology of contamination. What takes effect when anthropologists consider the internal autodynamics of a given contaminant? What happens when we consider that disasters such as oil spills and nuclear radioactivity are, in Bond’s

(2013) estimation, “agnostic to political boundaries” (p. 695)? While the semantics of contamination form a crucial part of our current understandings of the subject, I suggest that it is equally important to consider the agency of non-human forces as they pertain to contamination, namely as actants whose mechanisms can hinder our cultural and social realms. Anthropologists have much to gain by focusing on matter and by envisioning the agency of given materialities as an integral aspect of analytical processes surrounding contamination.

In this paper, I will follow Latour’s (2004) definition of an actant as “a source of action that can be either human or nonhuman; it is what has efficacy, can *do* things, has sufficient coherence to make a difference, produce effects, alter the course of events” (as cited in Bennett, 2010, p. viii, original emphasis). In recent scholarship, matter has been linked with more than mere passive intractability (Bennett, 2010). Indeed, as Bakker and Bridge (2006) argue, the different materialities of resources may be “sources of unpredictability, unruliness and, in some cases, resistance to human intention” (p. 18). This is an interesting avenue in recent anthropological scholarship (Helmreich, 2009; Ingold, 2012) which might provide, in Choy’s (2011) words, a “reviving breath” (p. 168) for social theory.

I will begin this article with an account of the anthropological literature surrounding contamination, while subsequently identifying related issues, both potential and recurrent. I will frame this subject around literature pertaining to toxic disasters, since issues of contamination have been shown to significantly impact both human and non-human subjects (Bond, 2013; Fortun, 2001, 2004; Hamilton, 1985; Little, 2012; Masco, 2008; Petryna, 1995, 2013; Singer, 2011). This will be carried out using theory linked to materialism, focusing on the work of Bakker and Bridge (2006), Barad (2003, 2012), Bennett (2004, 2010), Choy (2011), and McLean (2011). This methodology seeks to provide a reorientation that might, as McLean (2011) argues, reveal the limits of our terminology while simultaneously exposing a

“dynamism and creative potentiality” around matter (p. 592). To provide more specific and illustrative examples (i.e., the ways in which societies, governments, and individuals think about and interact with matter), I will use the case study of nuclear contamination revolving around the Fukushima Daiichi Nuclear Disaster. Finally, I will discuss the ways in which contaminated matter is reified into diverse hybrid objects of analysis that are entangled in a play of multiple relationalities that oscillate between the natural and human realms.

### **Contamination in the Anthropological Literature**

To contaminate is to render something dangerous, dirty, or impure through the addition of another *thing* considered to be harmful or undesirable to the former (Merriam-Webster Online, n.d.). This association is one of infection or corruption; it implies a reclassified state of inferiority, as contamination is the process of making something unfit (Merriam-Webster Online, n.d.). The English word contaminate derives from the Latin term *contaminates*, which is closely associated with *contingere*, meaning to have contact with (Merriam-Webster Online, n.d.). Contamination is, then, wholly understood within the context of a particular relationship, namely one that is undesirable or harmful. With this relational understanding in mind, this section will explore how the discipline of anthropology has mined the subject of contamination. Specifically, it will outline the major themes, theoretical frameworks, and ethnographic approaches that have been employed; it will then delve into deeper themes including the binaries of contamination.

It is important to note that contamination itself is often not the primary subject of interest for anthropologists. Rather, contamination tends to be one of many issues entangled in inquiries about other subjects ranging from hierarchical systems and inequalities to purity, risk perception, pollution, environmental health, infection, and policy making (Douglas, 2002; Farmer, 2001; Fortun, 2001; Little, 2012; Malkki, 1995; Petryna,

2013). Structural-functionalists are among the first anthropologists to have studied topics related to contamination. One notable example is the work *Purity and Danger*, in which Douglas (2002) focuses on taboos maintained as rules against contamination and impurity. She is interested in the symbolism of dirt and how such a concept interacts with social orders and structures. In her view, ideas of pollution and contamination make sense in reference to “a total structure of thought whose keystone, boundaries, margins and internal lines are held in relation by rituals of separation” (Douglas, 2002, p. 51).

Contaminated matter represents an offence against order, and its elimination (i.e., separation) is therefore an effort to organize the environment and everything in it. Douglas (2002) holds that in separating out what is dirty or contaminated people are re-ordering their environment so as to make it conform to a particular idea. Notably, dirt or contamination in itself has no intrinsic power unless it is encoded in a set of symbolic systems. As Douglas (2002) argues, contamination is not inherent to a given object: “there is no such thing as dirt; no single item is dirty apart from a particular system of classification in which it does not fit” (p. xvii).

More recent accounts suggest that the human and ecological trauma linked with toxic disasters and their ensuing contamination processes (e.g., oil spills, chemical leaks, and nuclear meltdowns) have stimulated a broader form of thinking related to environmental as well as social issues (Hamilton, 1985). For instance, Petryna (2013) demonstrates how, in the aftermath of the Chernobyl nuclear disaster, radioactive contamination shaped the everyday lives and experiences of affected citizens. In her account, while contamination intersects with many diverse issues, it is primarily imbued in a Foucauldian discourse of biopower. This refers to the factors that control life, namely “what brought life and its mechanisms into the realm of explicit calculations and made knowledge-power an agent of transformation of human life” (Foucault, 1980a, p. 143, as cited in Petryna, 2013, p. 13).

This work also entangles the notion of contamination in a Marxist approach, as the author demonstrates that problems surrounding radioactive contamination are manipulated into lucrative industries (e.g., the pharmaceutical and medical industries). According to Petryna (2013), being contaminated—that is, being sick as opposed to un-sick—can be turned into an asset for some citizens. However, particular forms of knowledge and capacity (as well as time, money, and contacts) are crucial in order to turn one's contaminated condition into a potential asset that enables the financial survival of the individual through governmental compensations.

Furthermore, in Petryna's (2013) estimation of nuclear radioactivity, contamination is regarded as knowledge interwoven through technological and governmental epistemes. In her case study, contamination is shown to be a form of knowledge that can secure one's future, if the citizen can find a way to assess his or her actual dosage while getting access to documentary 'proof' of his or her condition (Petryna, 2013). Nuclear-induced contamination therefore actually acts as a mediator, or something towards which 'bodies' (i.e., citizens) gravitate. Contaminated matter, including radioactive fallout, isotopes, or the Chernobyl sarcophagus, is *not* the primary concern of Petryna's (2013) anthropological inquiry. Rather, it is the *negotiation* of contamination (e.g., healthcare access, citizen narratives, disagreement about what constitutes risk, and the social effects pertaining to the trauma of contamination) that is being ethnographically tracked. This path has proven to be quite popular in the socio-cultural field; as Little (2012) asserts, "community contamination and the biopolitics of toxic exposure have long been topics of interest for anthropologists and sociologists researching environmental contamination and industrial disaster" (p. 446). Contamination has also been a widely popular area of study among medical anthropologists. This line of inquiry has perhaps best been emphasized through anthropological studies centring on pathological organisms such as HIV, particularly those

exploring concepts such as infection, inequality, and structural violence (Farmer, 2001).

Theoretical approaches that focus on affect have also been used to investigate how moods and aesthetic sensibilities can potentially influence the ethics and politics of contamination and decontamination (Little, 2012). Such studies demonstrate that emotion, feeling, and affect can inform residents' perceptions and understandings of risk mitigation in a toxic environment (Little, 2012). Notably, these approaches have studied the "whirlpool of emotions" surrounding the mitigation of toxic chemical exposures (Little, 2012, p. 446). For instance, focusing on a small community situated near an industrial hazardous waste site in New York, Little (2012) draws on the diverse ways in which emotions like angst, frustration, and uncertainty persist even after the implementation of strategies to mitigate subsequent environmental destruction and contamination. While this methodology remains relevant, it is also important to ask how the exploration of attitudes, feelings, and beliefs related to hazardous environmental contaminants can benefit anthropological inquiries into such topics. Singer (2011, p. 158) provides a compelling answer to this question, showing that tracking feelings (what he refers to as "toxic frustration") reveals that contamination does not exist in isolation from other aspects of the social experience. Rather, it is a "component of a wider and deeper sense of enduring disappointment, social injury, and political economic marginalization" (Singer, 2011, p. 158), which could be conceptualized as a form of structural vulnerability.

### **The Binarism of Contamination**

Anthropologists have long viewed contamination in somewhat dualistic terms, or as binaries. As Castree and McMillan (2001) argue, binaries refer to "the habit of understanding the world in terms of conceptual dichotomies" (p. 211). Common notions about contamination and non-contamination often exist in opposition, where infection contrasts against wellbeing, purity confronts impurity, and pristine nature opposes

toxic landscapes, all in mutually *exclusive* domains. But is it also possible to conceptualize contamination in non-dichotomous ways? That is, can we unbind this concept in order to advance our restricted (and somewhat simplistic) understandings? And what, if anything, might be gained by re-evaluating contamination through such an unbound, non-binary lens?

The problem with binarist thinking is that it ultimately forces the analyst to make a clear choice, to “prioritize one or [the] other domain or actor on ontological, causal, or normative grounds” (Castree & McMillan, 2001, p. 213). For example, narratives surrounding radioactive contamination from the Fukushima nuclear disaster are often clearly divided between the human and the natural realm. After Tokyo was named as the host city for the Summer Olympic Games of 2020, Shinzo Abe, the Prime Minister of Japan, told the International Olympic Committee that the situation at Fukushima would have no effect on the event or its participants (Smith, 2013). Specifically, Abe claimed that the Fukushima nuclear disaster “has never done and will never do any damage to Tokyo. It poses no problem whatsoever. [...] There are no health-related problems until now, nor will there be in the future” (as quoted in Smith, 2013). As the prime minister’s statement suggests, ecological contamination caused by this disaster is perceived as totally independent from, and having no impact on, the human population. This binary assertion is not uncommon; in the aftermath of a disaster, there is often widespread denial of any link between social issues and environmental ones (Cleveland, 2014; Funabashi, 2012; Kingston, 2012).

Binary responses have cultivated a rather fixed understanding of contamination not only among anthropologists, but also among citizens and governments. Our conceptual thought patterns—those paradigmatic systems through which many of our apparatuses organize, filter, and understand reality—involve false divisions, thereby incorporating a “constant disequilibrium” (Hoffman, 2002, p. 114). As Hoffman (2002) states, “culture, for example, is not in fact truly

separate from nature, only categorized so by certain people” (p. 114). Therefore, tackling contamination through binarisms is a pointless exercise. The rejection of dualism should encourage us to think of contamination in “terms of associations instead of separations” (Castree & McMillan, 2001, p. 211). The notion of contamination should be embraced as a hybridized concept that exists in the gap between the material and ideological worlds.

### **Theory of Contamination**

One theoretical approach that could provide a richer (and less binary) understanding of contamination involves focusing on multiple forms of agency, both human and non-human, as well as on their interactions. Such an approach to understanding matter would highlight the importance of the internal autodynamics and self-organizing processes of given entities (Barad, 2003, 2012; Bennett, 2004, 2010). However, there are some questions that should be asked before enlisting a new theoretical approach. Why exactly is an understanding of matter and materiality important to our notion of contamination? How can anthropologists ethnographically track matter, a wholly non-human entity? Does tracking contamination in this way fall within the purview of anthropology?

As a focus on matter has enjoyed some popularity among social scientists, this body of literature should be of interest to anthropological scholarship as well. For instance, political scientist Jane Bennett (2004) has proposed “thing-power materialism,” defined as “an attempt to depict the nonhumanity that flows around but also through humans” (p. 349). She seeks to rewrite the default language of agency, a language she describes as mostly assigning activity to people while imposing passivity on things. Her inquiry revolves around how political responses to modern issues might change if we were to consider the capacity of things to not only “impede or block the will and designs of humans but also to act as quasi-agents or forces with trajectories, propensities, or tendencies of their own” (Bennett, 2004, p. viii). Her aim is therefore to theorize a ‘vitality,’ or form of

vibrancy, that in her view is intrinsic to materiality, and by so doing to detach matter from the passivity that we have saddled on it (Bennett, 2004).

Concern about matter has also characterized the work of feminist theorist Karen Barad (2003). However, she frames this issue in a wholly different way, by proposing a post-humanist notion of performativity. As she argues, “considering matter as merely an end product rather than an active factor in further materializations would be to ‘cheat matter out of the fullness of its capacity’” (Barad, 2003, p. 810). From her point of view, matter is not merely a thing or collection of things to be perceived as a single fixed or essentialized entity, but is rather a “congealing of agency” (Barad, 2003, p. 828).

Following these social scientists’ investigations, some anthropologists have also begun to ask whether there is a “dynamism and creative potentiality inherent to matter itself” (McLean, 2011, p. 592). Such inquiry seems to mark a change in anthropological thinking. For example, Douglas (2002) has argued that rubbish is not dangerous. By itself, rubbish is nothing; it is not considered to be contaminated matter, at least not so long as that given identity is absent (Douglas, 2002). Yet, according to Bennett’s (2010) estimation, a lot can happen if we consider the capacity of matter not simply through passive intractability, but through the production of effect. In a similar vein, Oliver-Smith (2002) has argued that natural forces, not unlike matter, exist as agents whose physical processes are partially outside the human realm.

Through this lens, hazardous materials, including spilled oil, toxic gas, and nuclear radiation, are exosemiotic forces that refuse to recognize our political, social, and cultural realms. It is important to note that a focus on matter should not be seen as an attempt to disengage nature from culture, a separation that has been described as a “pointless dualism” (Oliver-Smith, 1999, p. 28). On the contrary, such literature may help to highlight the unchallenged connections and the interconnected relationships that surround contaminated matter. This new array of

possibilities then becomes an interesting jumping-off point from which to increase our unbound understanding of contamination.

### **Contaminated ‘Matters’**

The case study of the Fukushima nuclear disaster provides a specific example of the performativity and agentive nature of a given entity (in our case nuclear radiation) in the process of contamination. March 11, 2011 saw the most powerful earthquake that Japan has ever recorded. This earthquake, which shook the Pacific coast of the Tohoku, was quickly followed by an equally devastating tsunami. The Fukushima Daiichi Nuclear Power Plant, owned by the Tokyo Electric Power Company, was greatly damaged by these two successive natural disasters. Three nuclear reactors overheated, resulting in meltdowns and numerous hydrogen explosions. Radioactive gas was released into the atmosphere and further human error and manmade catastrophes caused the discharge of additional radioactive materials. Following the disaster, contaminated water used to cool the reactors seeped into the ocean surrounding the power plant. These leaks were so critical that the incident was classified as a level seven—the highest level possible for a nuclear disaster—on the International Atomic Energy Agency’s Nuclear Event Scale.

Immediately following the reactors’ meltdown, an emergency evacuation of the surrounding area was put into motion. At first, the Ministry of Economy, Trade, and Industry (METI) issued an ‘in-house’ evacuation order only; people in the immediate vicinity were advised to stay indoors and remain prepared to leave the area if so ordered. As the seriousness of the disaster became apparent, this evacuation order was gradually expanded. By the following day, March 12, 2011, it encompassed a 20-kilometre radius around the power plant (METI, 2012, p. 3). Three days later, on March 15, 2011, the evacuation order encompassed a 20- to 30-kilometre radius, and all people living in this area were advised to prepare for an imminent evacuation on March 25, 2011 (International Medical Corps, 2011). By December

26, 2011, restricted areas were organized into three divisions, each of which corresponded to a different annual cumulative dose of radiation projected to be received by residents if they remained (METI, 2012). Area 1 corresponded to areas in which evacuation orders were ready to be lifted. Area 2 encompassed locations where residents were still not permitted to reside, and Area 3 encompassed areas where it was expected that residents would be unable to return for a long time.

This mapping process is particularly interesting. Among scientists and government officials maps are often perceived as the holy grail of radioactive risk mitigation, as their use enables the representation of an otherwise intangible threat. Like radiation monitors, they provide an objective viewpoint upon the otherwise 'invisible' characteristic of radioactive contamination (Pena-Vega, 2004). In contrast to toxic disasters such as oil spills, nuclear radioactivity is impalpable; it is colourless and odourless. Unlike microbes or viruses, radioactivity cannot be studied under a microscope. Nor is its damage clearly evident, as with earthquakes and tsunamis. There is therefore an apparent uncertainty related to nuclear contamination and its tracking, regardless of the certainty that risk mitigation maps intend to impose.

In one sense, mapped areas contain contamination; they help to lend a sense of certainty by demarcating which areas are safe and which are not. However, what would happen to this sense of certainty if we were to consider the non-human agency of nuclear energy? By nature, radiation moves "according to shifting winds and the prevalence of rain[;]...respected Ukrainian scientist Dmytro Grodzinsky describes these particles, particularly cesium-137 and strontium-90, as everlasting wanderers 'that can-not be absorbed in plants and are carried by the wind from place to place'" (Marples, 1989, p. 27 as cited in Petryna, 1995, p. 215). As such, it can be argued that the nuclear radiation released during the Fukushima disaster does not obey the simplified 20- to 30-kilometre radius that the METI has

identified on its maps. Even when considering the advanced weather modeling applied when mapping radioactively contaminated areas, the resultant maps represent only an approximation of where contamination could exist. For example, it was later shown that during the initial evacuation some people were transported to even more heavily contaminated areas than the ones from which they originally fled (Hasegawa, 2012).

Another way that mapping fails to contain nuclear contamination relates to food consumption, since radiation has the potential to contaminate many agricultural and food products (e.g., fish), including those that originate in the Fukushima region but are shipped and consumed throughout Japan. Some government-sponsored efforts are being made to track the levels of radioactivity found in agricultural products and seafood originating in Fukushima. However, the mapping of this disaster and its radioactive fallout may be producing a false sense of security for citizens, who are told that food contamination levels are, for the most part, safe. Maps, by their very nature, may promote thinking about radioactive contamination in a binary way, demarcating things as being either radioactive, and therefore contaminated, or 'normal' and non-contaminated (see also Pena-Vega, 2004). However, such binarisms do not promote an understanding of the materiality of nuclear contamination or, more importantly, a nuanced telling of the story. Can an area situated only 100 metres outside of Area 3 be considered truly safe, that is, wholly non-contaminated? While the safety procedures implemented following this disaster included a significant effort to demarcate dangerous zones, and were undoubtedly useful in many ways, mapping processes can also function as a double-edged sword as they clearly divide the residents of Fukushima from the residents of *other* prefectures. Such procedures indirectly reinforce the identity of residents and evacuees as potentially sick or impure, and thus different from the Japanese urban majority. Beyond their physical aspect, these perimeters send a clear binary message: some people are contaminated, while some are not. Yet, as many have shown, risks of

exposure to radioactive materials are not only faced by the prefecture of Fukushima, but by all Japanese people (Cleveland, 2014; Hasegawa, 2012). Nonetheless, a discriminative attitude has recently been denoted toward the residents and evacuees of Fukushima. Many are facing social discrimination and are perceived as contaminated and impure (Allison, 2013). This stigmatization is clearly linked to a fear of radioactive contamination which is still largely based on misunderstanding and prejudice, including the idea that radiation is contagious (Aoki, 2013).

The materiality of nuclear contamination induces another form of displacement as well: temporal displacement. As Masco (2008) reveals, the uncertainty surrounding nuclear contamination is “also intensified by the specific attributes of radiation-induced illness, which includes a displacement in time (sometimes occurring decades after exposure) and a potential to be genetically transferred across generations” (p. 521). A focus on matter and materiality (as opposed to simplified binarisms) therefore brings a new perspective as to how nuclear contamination and risk are affected by the passage of time. Interestingly, such a perspective reveals a specific form of ongoing injury that can hardly be policed or contained by a government of the moment, as the lifespan of radioactive contamination significantly transcends the human lifespan. For example, the 24,000-year half-life of plutonium requires a different temporal analytic if we wish to study issues related to contaminated ecologies (Masco, 2008).

A focus on matter (and its own agency) can bring a completely new perspective to how humans understand not only contamination, but also its temporality. Deeply held binary beliefs about what is clean and what is dirty may change if we consider the non-binary material aspects of the contaminants. The materiality of contamination, as it resists human agency, emphasizes the idea that we are dealing with boundaries that are not physical or geographical, but that are mere *conceptualizations* that provide a “false sense of civilization and separation from nature” (Dawdy, 2006, p. 723). It highlights the distorted

perceptions hidden behind what Latour (2004) refers to as “matters of fact” (pp. 22-23), that is, risk-free objects that have clear boundaries, well-defined essence, and well-recognized properties. “Matters of fact” hide the more nuanced, subtle experiences, embodied through “matters of concern,” which unlike their predecessors have “no clear boundaries, no well-defined essences, no sharp separation between their own hard kernel and their environment” (Latour, 2004, p. 24). “Matters of concern” prevent the “proliferation of smooth, risk-free matters of fact, with their improbable cortege of incontestable knowledge, [...] predictable impacts, calculated risks, and unanticipated consequences” (Latour, 2004, p. 27). A focus on the agency of radioactive matter enables us to frame the discussion of contamination in entirely new ways, including conceptualizing contamination as a “matter of concern,” which may allow us to better tackle this state of affairs. Conversely, “matters of fact” are more reminiscent of the circular, computerized 20-30 km radioactive radius originating from METI’s offices and disseminated widely throughout our information-based societies.

In the same vein, it is interesting to examine the concept of a perfect circle. As Nagel (2014, p. 57) argues, round is often synonymous with something that is roughly circular. While rounded things might naturally appear in greater numbers than circular things, the concept of a circle is still thought of as more basic, elemental, and true. In other words, a circle is thought of as a “matter of fact,” a legacy of the Cartesian paradigm that has influenced knowledge-making in the sciences. As Nagel (2014) exposes:

Known as rationalism, this way of thinking puts abstract concepts at the heart of our pursuit of knowledge. Descartes, whose own contributions to algebra and geometry were substantial (and included the development of Cartesian coordinates in geometry), was keen to defend the Modern enterprise of using mathematical tools to analyse nature (p. 37).



Nagel (2014) also argues for the circle as a fundamental starting point, “something we used in defining ‘rounded’, and for good reason: the clean geometrical nature of circularity is simpler than the messy geometrical nature of approximations of circularity” (p. 57). Therefore, the mapping of the Fukushima disaster can be said to mask, to a certain degree, the interconnectedness of people and nature “behind layers of simplified geometric shapes, scientific engineering, and rational mode[s] of production” (Walker, 2010, pp. 73-74). While we may analyze the Fukushima nuclear disaster and its ensuing contamination in part through mapping, such schemes of production also cast shadows on the agency of nuclear radiation, which has the potential to resist not only our control, but also our current epistemes.

### **Discussion: A Cautionary Note**

With regard to contamination, a focus on matter can be useful when attempting to forge ahead of outdated theoretical approaches that perceive all significant actors as human, and all action as being “associated with *intentionality* and *linguistic competence*” (Castree & McMillan, 2001, p. 213, original emphasis). While an approach that recognizes the agency of matter can be useful as we seek to deepen our understanding of contamination, claiming the independence of matter also runs the risk of reducing our reality to a mere set of natural phenomena and non-human agents, once again bringing us back to a binarist way of thinking. We must be cautious when considering any intrinsic capacity of matter to exert agency. As Bennett (2010) advises, an actant never truly acts alone, as “its efficacy or agency always depends on the collaboration, cooperation, or interactive interference of many bodies and forces” (p. 21). The concept of contamination is therefore best described as a hybrid issue, with many overlapping actants involved in complex interrelationships. The capacities of contaminants such as radioactivity derive from specific forms of association, and some of these associations are stronger than others (Bakker & Bridge, 2006). Conceptualizing contamination through a non-

reductionist lens therefore requires us to trace the particular network in which contaminated matter is embedded. This may serve to extract the notion of contamination from a set of binary oppositions (pure against impure) that are too often anchored to unacknowledged assumptions.

Another factor that is crucially important to the conceptualization of contamination is the role of technology. While a broadened understanding of the role of matter is indeed an important conceptual starting point, matter is modified and shaped through powerful technological processes and apparatuses that tend to flatten its agency, at least in part. It is therefore equally important to highlight the technology-induced conformations and deformations through which matter is modulated (Ingold, 2012). In terms of the so-called ‘informating’ of environmentalism, Fortun (2004) explains that “what becomes evident is that it is not only nature, or the environment per se, that makes a difference but also the information systems through which the environment [contaminated in our case] becomes accessible to understanding and governance” (p. 286). Furthermore, she adds that “the materiality of nature may not be produced by these systems themselves, but these systems do determine quite literally what counts and what does not” (Fortun, 2004, p. 286). This determination of what ‘counts’ is clearly evident in the METI’s process of mapping the Fukushima nuclear disaster.

While the discussion on matter and the agency of materiality needs to be part of a new unbound framework for considering contamination, we must also be aware of those technological processes and struggles related to “how things would be categorized, counted, and represented graphically (as well as politically)” (Fortun, 2004, p. 290). Interestingly, although we can argue that radioactive matter has agency of its own (that is, it can *act* upon human beings), the reverse is also true. The agency of natural and unnatural forces surrounding the Fukushima disaster has fallen under the jurisdiction of very human technical expertise, governmental apparatuses, and specific organizations. In this way, matter itself also

becomes, in Barad's (2003) words, an "ongoing historicity" (p. 821, as cited in Ingold, 2012). In other words, in understanding contaminated matter we also have to "be able to tell their histories—of what they do and what happens to them when treated in particular ways—in the very practice of working with them" (Ingold, 2012, p. 434). I cannot emphasize this idea due to lack of space, but let us not forget that Japanese society has very distinct cultural politics of ambivalence, fear, negotiation, and resistance surrounding nuclear material.

### Conclusion

A new acknowledgement of the materiality of contamination has the ability to push the limits of our epistemology pertaining to the kinds of actants that affect human beings. Different matters do have different specificities with regard to their doing or their resistance upon human agency. The 24,000-year half-life of plutonium is a good example of this, as the agency of this matter implies new forms of episteme for understanding issues such as environmental contamination and degradation. However, this is not an easy task; as Little (2012) highlights, ethnographic approaches have always been more focused on people than on actants such as toxins and contaminants.

When it comes to investigations into contamination, Bennett (2010) argues that "anthropomorphizing, the interpretation of what is not human or personal in terms of human or personal characteristics, is clearly a part of the story" (p. 98). However, perhaps the terminology surrounding anthropomorphization is not the most relevant language for the task, since the re-culturization of non-human agency seems to differ too little from semiotic inquiries. As such, we need to ask if anthropologists have the language to tackle these issues. For example, the terms independent and intrinsic may be problematic when used to describe matter, since the connotations of these words seem to closely echo a mutually exclusive separation between nature and culture. Furthermore, *thing*, understood as a resource or

object, impedes us from acknowledging the "variability of matter" like kinetic energy and electromagnetic waves (Ingold, 2012, p. 433). The term is also synonymous with notions of solidity and homogeneity, words that are reminiscent of "matters of fact." Still, it is important to consider that the line of inquiry advanced in this article—the theoretical focus on the agency of matter—is still an "arena of debate" more than a theory (Ingold, 2012, p. 436). As Viveiros de Castro (2004) explains:

There are 'materialist ontologies' on offer as cures for epistemological hypochondria, but I do not know what to do with them. All I know is that we need richer ontologies and that it is high time to put epistemological questions to rest (p. 484).

Even though this line of thought is still largely just an exercise, it raises a set of interesting questions that *do* have the potential to generate the richer ontologies that Viveiros de Castro is looking for.

Epistemological questions do not necessarily have to be put to rest, as richer ontologies can provide the jumping-off point necessary to nurture richer epistemes that extricate themselves from binary opposition and monism. What is needed is perhaps a *broader* definition of social that encompasses non-human actors and does not exclusively grant agency to humans. Matter, if understood according to that line of thought, can be a compelling solution. As Latour (2004) argues:

As soon as we stop taking nonhumans as objects, as soon as we allow them to enter the collective in the form of new entities with uncertain boundaries, entities that hesitate, quake, and induce perplexity, it is not hard to see that we can grant them the designation of actors (p. 76).

If we are to think of contamination in new ways, then we must first analyze and theorize it as a specific hybrid, one that is co-produced by an

array of bodies, forces, processes, and relationships. Contamination derives from the coalescing of matter, technology, governance, society, and culture. We need to embrace, grapple with, and oscillate between those tensions, for artificially separating them will only produce works that do not contribute to a better, more unbound understanding of the topic.

The challenge for anthropologists is therefore to theorize an agency of matter while simultaneously being mindful of how humans are inextricably linked with the construction of the forms, scales, and framings through which that agency “expresses its doing” (Oliver-Smith, 2002, p. 39), and also expresses its historicity. As the mapping of contaminated areas surrounding the Fukushima region has shown, the agency of nuclear radiation is filtered by powerful mechanisms, whereby both technology and governance determine what is perceptible—that is, what counts—and what is not (Fortun, 2004). As Fortun (2004) reveals, “the gray matter between certain truth and the unknowable is made a part of our thinking and decision-making” (p. 296).

To conclude, this article provides a venue to theorize and reformulate the various forms of “communicative energies” between human beings and matter (Barad, 2003, p. 104). It provides an opportunity to analyze the agency of things themselves, even as they exercise their immunity to human power and follow paths, trajectories, and relations that may or may not intersect with human activity. Hopefully, this article presents a better way of understanding the specific capacity of things to exert influence upon our cultural paradigms linked with contamination. In this way, crucial topics regarding the complex crossroads between human and non-human interactions (e.g., environmental contamination) may begin to be defined in more nuanced, non-dualistic ways. There is a chance to better understand how we interact with our surroundings if we exhibit what Law (1999) calls “the willingness to live, to know, and to practise in the complexities” (p. 14). Perhaps embracing these entanglements may tear down some of the misunderstandings surrounding the

Fukushima disaster, especially those that pertain to the social stigmatization faced by its residents and refugees.

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