

Sensing, knowing, and making water quality along Marikina River in the Philippines

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ABSTRACT

Water quality is a major concern around the world, but assessments of quality often privilege producers, regulators and experts over consumers. With water supplies and sources constantly in flux, how do ordinary people experience and “sense” quality? How do they define “good” or “good enough” water, and what practices do they engage in to “make” good water? In this article, we attend to these questions by presenting findings from an open-ended qualitative study carried out along the Marikina River, Manila, the Philippines – a waterway that courses from rural and mountainous villages to highly urbanized communities. First, we describe the sensorial and cognitive attributes that people associate with the different water sources in their environment, as well as their decision-making regarding what kind of water to use for which purposes. Second, we present the “making” of water quality: how, in a context of polluted environments and water scarcity, do people try to secure water they consider acceptable for themselves and their families. Our findings reveal water quality as a contested, relational domain—one that reinforces social and health disparities and calls for further scholarship.

ABSTRACT (TAGALOG)

Ang kalidad ng tubig ay kinababaha sa buong mundo, ngunit ang pagkilatis ng kalidad na ito ay kadalasang nasa kamay ng mga kompanya ng tubig, mga dalubhasa, at gobyerno, - wala sa mga tao. Sa kabila ng mga pagbabago at pangamba ukol sa tubig, paano nga ba nararansan at nararamdaman ng mga ordinaryong tao ang kalidad ng tubig? Paano nila nasasabi na maganda, o puwede na, ang isang klase ng tubig, at anong mga pamamaraan o diskarte ang ginagawa nila para maging ‘puwede na’ ito? Sa artikulong ito, tinatalakay namin ang mga katanungang ito base sa isang *qualitative research* na isinagawa namin sa mga bayan sa kahabaan ng Ilog Marikina, na dumadaloy mula sa bulubunduking kanayunan ng Sierra Madre hanggang sa mga urbanisadong pamayanan ng Kamaynilaan. Una, inilalarawan namin ang mga katanungang na inuugnay ng mga tao sa iba’t ibang uri ng tubig sa kanilang kapaligiran, at kung paano sila nagdedesisyon kung alin sa mga ito ang gagamitin sa iba’t ibang paggamitan. Pangalawa, ipinapakita namin kung paano nila ginagawang ‘puwede na’ ang tubig para sa kanila at kanilang mga pamilya. Sa kabuuan, napag-alaman namin na ang kalidad ng tubig ay isang komplikadong larangan, nakaugat sa iba’t ibang relasyon, nakapagpapalala sa mga hindi pagkakapantay-pantay ng lipunan, at nananawagan ng mas malalamin na pag-aaral.

IMPLICATIONS

People living along Marikina River rely on everyday experiences to define “good enough” water and decide what kind of water to take. If the water is not clean, they either choose another source or engage in various household practices to make it good enough, from boiling and filtering to simply waiting. Upstream, the water is perceived as cleaner and has more uses; as the river flows to Manila, people rely increasingly on mineral water and water from refilling stations for drinking. But what kind of what people use, for what purpose, is influenced by social and economic factors. We suggest that governments monitor the quality of water in different sources, and evaluate how people try to make water cleaner and safer. Governments need to take into account how people sense, know, and make water quality in crafting better and fairer policies and programs.

KEYWORDS

Water quality; water insecurity; water governance; environmental anthropology; Philippines

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SOCIAL MEDIA STATEMENT

What is “good” or “good enough” water for people? The authors explore the knowing, sensing, and making of water quality along Marikina River in the Philippines, and how people’s embodied experiences of water are shaped by their geographic, economic, and “hydrosocial” contexts.

Water sources around the world are increasingly polluted, compounding the problem of water scarcity. Identification and problematization of various pollutants, each with their consequences to human and environmental health—from microorganisms and microplastics to chemicals and pharmaceutical residues—has made water quality a major global health concern (Li and Wu 2019; Downing et al. 2021), as part of (and on top of) general concerns around water security and equity (Adams, Zulu, and Ouellette-Kray 2020). With “clean water and sanitation” among the Sustainable Development Goals (SDG 6), the United Nations calls on governments to “improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally” (United Nations, n.d.).

Most policies concerning water quality, however, privilege the principles, practices and assessments of producers, regulators and water scientists. While their definitions of quality differ, depending on the measurements that they use for assessment (mainly bacterial indicators), there is growing recognition among technical experts that “perceived drinking water quality is more important than actual drinking water quality” (Furlong 2010, 1).

Beyond people’s “perceptions,” policymakers likewise overlook local, experiential knowledge that informs water choices, as well as ordinary people’s own practices of “making” good water, in what we might consider examples of “environmental harm reduction.” Scarcity and intermittency of water—also a major health concern and source of distress (see Wutich and Brewis 2014)—and increasing occurrences of floods and typhoons related to climate change (Arora 2019; Roque et al. 2023) add a temporal dimension to the issue of water quality and raise the question of how people sense changes in quality, both on a daily basis and in response to crisis situations, such as droughts and flooding. Even in countries like the Philippines, where access to tap water has dramatically increased in recent decades, the intermittency of water, particularly in very low income communities, especially during the typhoon season, compels us to

attend to how people grapple with changes in water flows and quality in the absence of infrastructures that ensure safe water and/or trustworthy measurements.

In this article we seek to help address and inform this policy shortcoming by presenting findings from a focused ethnographic study along the Marikina River, a major waterway supplying Metro Manila, which is home to over 20 million people. Water insecurity in the Philippines is a well-explored subject, with research ranging from household water portfolios (Mason 2012) to the political economy of water (Hall et al. 2015; Pulhin et al. 2018). However, as in many global south contexts, how consumers themselves experience, “sense,” and “make” water quality through their own practices has not been thoroughly investigated.

Drawing inspiration from studies on water quality in environmental and applied anthropology, we consider water as *social*, *material* and *technical*. We subscribe to Orlove and Caton (2010, 403) view that “the point ... is not to determine where social constructions end and materialities begin, but to see how complexly they are intertwined.” Water, of course, is also *hydrological*, dynamically changing during periods of drought and flood. Mindful of these complexities in the making of what people end up consuming, we address three major questions: First, how do urban communities value water (or different kinds of water) in relation to the diverse everyday practices through which they relate to it? Second, what kinds of sensorial attributes do people use to evaluate water quality? Finally, how do people make water good (enough)? The answers to these questions do not just contribute to our understanding of human–water relations in settings of insufficiency; they also hold implications for policies regarding water quality and safety, as well as overall environmental health. Beyond describing people’s sensorial and experiential knowledge of water quality, inspired by the STS turn to praxiography (Mol 2002), we examine the techniques people use to enhance water’s quality.

Focusing on one particular body of water—the Marikina River—this study is also anchored in the idea that following the river’s course can allow us to identify upstream and downstream variations in experiences and practices that we can then relate to other gradients of Philippine society, and more broadly, to the ways

people live with water along the river as it flows from the mountains to densely populated industrial areas, which political geographer Kristian Saguin (2017, 1969) calls “urban hazardscapes.” As scholars have found elsewhere (Scaramelli 2013; Salmond, Brierley, and Hikuroa 2019; Boelens et al. 2022), rivers are natural units of analysis for human–water relations, and we hope that this article is supportive of this approach.

Multiplicities of water quality

Ethnographies of water quality have the potential to “attend to the multiplicity of competing interests, embodied practices, and values attributed to water by different groups situated in complex relationships of power and identity” (Scaramelli 2013, 151). Water itself is “multiple,” given its many forms and “diverse and lively materialities” (Vogt and Walsh 2021, 4). By privileging embodiment and everyday experiences of waters in flux, anthropologists bring a “uniquely holistic sensibility to the study of water” (Wilfong, Paolisso, and Trombley 2023, 197) and call “attention to the creative and imaginative ways people conceive of and address their suffering from water” (Ennis-McMillan 2001, 386; see also Long et al. 2013; Limbert 2001).

Within this body of rich, ever-expanding literature (Orlove and Caton 2010; Ballesterio 2019; Wutich and Beresford 2019), we build on works by anthropologists (Euzen 2003; Gartin et al. 2010; Radonic et al. 2022; Chelcea 2023) who complicate the concept of water quality by privileging embodied, relational ways of sensing water, that is, how people relate to, evaluate, and act on water quality through their senses, bodies, and other species. We thus respond to Strang’s (2005, 115) suggestion that “anthropological understandings of human–environmental relationships should incorporate a greater appreciation of sensory experience and of the part played by “natural” resources and their characteristics in the generation of meanings.” Such accounts present the Parisian water consumer as an active agent assessing water quality, resorting to “his (sic) memories of taste and smell, as well as on his visual and tactile recollections” in deciding which kind of water to drink (Euzen 2003, 265). Among residents of Phoenix, Arizona, “cultural consensus” is partly based on sensory evaluations like local water having a “funny taste” (Gartin et al. 2010, 5). New Yorkers’ resort to water filters is shaped by how they imagine their water—coming from the mountains but flowing through old pipes, as well as how filter manufacturers deploy semiotics; ultimately, however, everyday use of those filters is still filtered through

evaluations of the water’s color or taste (Chelcea 2023). For women in Flint, Michigan, water quality is not a “stable or self-evident condition;” beyond taste or smell, contaminated water can manifest in their bodies as skin rashes, discoloration, or other “embodied experiences” (Radonic et al. 2022, 1).

In non-Western, non-urbanized settings, where people often have multiple water sources from which to select, spiritual and cultural values inform human–water relations. Tr’ondëk Hwëch’in elders in Yukon, Canada use “organoleptic properties”—taste, odor, color, and turbidity—to choose traditional, *flowing* sources such as creeks over tap water on the basis of its telltale, undesirable, chlorine taste (Wilson et al. 2019). Similarly, women in eastern Ghana prefer traditional, “unimproved” water sources for reasons ranging from spiritual to the sensorial (Chew et al. 2019).

Limited local research in the Philippines references water quality: studies show that Filipinos are willing to pay for good-quality water (Jalilov 2017) and that a significant proportion of urban people engage in “point-of-use water treatment technologies such as purifier, filter and boiling” (Palanca-Tan 2017, 576) as well as “coping strategies” like waking up in the middle of the night to fetch water and boiling poor quality water (Hussain and Chaves 2023). By presenting the lived and embodied experience of water quality in a politically, economically, and hydrologically significant area in the Philippines, we aim to contribute not just to the global literature on water quality, but also to this local scholarship.

The Marikina River as a site of human–water relations

Contemporary local and international discourses on water quality tend to focus on the polluted state of the Philippines’ waterways, invariably noting the country’s unwelcome distinction as one of the world’s biggest plastic polluters (Corrales 2023). However, as Liboiron (2021, 122) notes, “(r)eports like these reproduce the erroneous truism that plastic pollution is a consumer problem rather than an industrial production problem.” Liboiron links pollution to colonialism, which holds true for the Philippines; as a tropical archipelago of over 7,000 islands, the country is blessed with an abundance of water resources, but centuries of colonial exploitation and unplanned urbanization have led to the degradation of waterways and watersheds alike. In recent years, microplastics contamination of river fishes has also been documented (Espiritu et al. 2023). Moreover, routinized

hazards, typhoons, and floods always pose the threat of disrupting not just water access, but also housing and livelihoods (Seng 2014).

The Marikina River exemplifies and magnifies the paradox of simultaneous water abundance and insecurity. It flows from the Sierra Madre mountain range—a major watershed—to Metro Manila, which like other global south metropolises, suffers from issues such as unreliable, untrustworthy tap water, a prominence of informal water systems, and the high cost of water for poor people (Beard and Mitlin 2021). With a length of 78 kilometers,¹ a drainage area of over 500 square kilometers, and an estimated 7.5 million people living in its basin (Berkman International Inc 2015), the Marikina River is one of the most historically and economically important waterways in the country. It remains a major water source for the metropolis, with the presence of Wawa Dam upstream and other dam projects under construction (Berkman International Inc 2015). However, agribusinesses (particularly poultry farms), deforestation, and increased commercial activities have led to local authorities and scientists declaring it “biologically dead,” associated only with destructive floods during the typhoon season and invasive species like the janitor fish (*Pterygoplichthys pardalis*) (Berkman International Inc 2015).

Complicating the Marikina River’s water environment is the political economy that shapes it. In the late 1990s, water distribution to its downstream urban communities underwent privatization into two companies—Maynilad Water Services, Inc. and the Manila Water Company, Inc. While their operations have been described as a “relative success” (Wu and Malaluan 2008, 225), their market and political dominance has diminished the valence of water rights (Hall et al. 2015). Privatization, jumpstarted by a \$1 billion investment the Asian Development Bank facilitated, has greatly expanded water access (Rivera 2014). However, upstream and low-income downstream communities remain deprived of piped connections and often have to resort to informal water systems. In the metropolis, these informal connections include “micro-network operations” that either distribute independently sourced groundwater or redistribute chlorinated piped water (Cheng 2014), as well as the proliferation of water-refilling stations, which

in the aftermath of water privatization some other scholars call “private delivery water” (Magtibay 2004). Less documented are upstream water systems, although water-refilling stations are increasingly pervasive even in rural areas (Palanca-Tan 2017). The indigenous Dumagats—who live upstream—are known to tap natural water sources, from aquifers to the river itself (Eballo 2019). Furthermore, 87% of households in Metro Manila connected to the water system experience regular water shortages (Matous 2013; Cheng 2014; Hussain and Chaves 2023), underlining the need for these informal systems. Aside from calling attention to the issues of water security and equity—including frequent invocations of downstream communities’ need for water as justification for upstream dam projects (see Talamayan 2020; Maningo 2023)—these water systems highlight the need to document people’s day-to-day water-related practices and experiences of relating to and with water.

Methods

This article is based on Embodied Ecologies, a multi-sited, interdisciplinary study that explores chemical exposures and how people engage in “environmental harm reduction” practices to cope with them (Embodied Ecologies Team 2024). This study attended to people’s sensorial experiences and embodied knowledges of environmental pollution, while also using ethnography and cartography to identify the practices through which they seek to prevent chemical harm. Water emerged as an important subject of a “focused ethnography” (see Trundle and Phillips 2023 for a review of this approach), so we decided to explore human–water relations along the Marikina River as a specific area of interest, premised on the analytic importance of seeing how water valuations and practices can change along a river’s course, from upstream/more rural to downstream/more urban. From March to July 2023, we—anthropologists both: a local researcher who grew up in the same linguistic region as the fieldsite and a foreign researcher who has been conducting fieldwork around the Marikina River since the 1980s—engaged in participant observation along the river. We adopted the simple principle of “following the water” (that is, following the river upstream, tracing the upstream sources of water people consume, tasting the water, talking to water drinkers, distributors and regulators) as our methodological approach. With our research assistants, we conducted 50 in-depth interviews in low- and middle-income river communities in four different local

¹Some sources provide a much lower figure (e.g. 31 kms), defining Marikina River as the portion between Wawa Dam and Pasig (i.e. Lower Marikina River). In this article we use the physiographic definition of the river from its headwaters in the Sierra Madre to Pasig River, of which it is considered a tributary (see Qian et al. 2000).

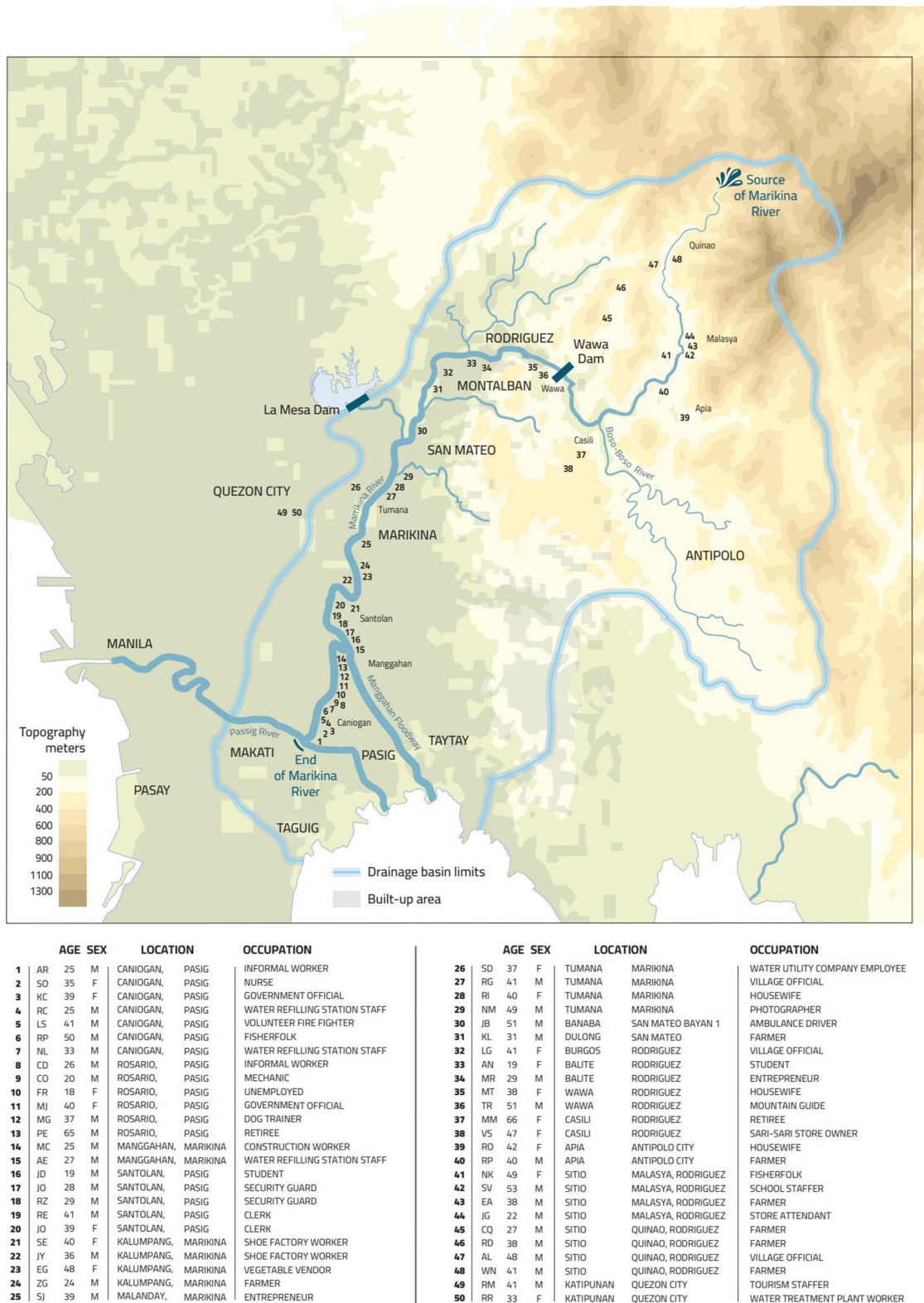


Figure 1. Different uses of water with increasing expectations and demands of water quality.

government units (LGUs): Pasig City (pop. 803,159), Marikina City (pop. 456,159), San Mateo (pop. 273,306), and Rodriguez (pop. 443,954). We sought to represent various points along the river’s course in the four LGUs and to sample various demographic

variables through peer referrals and spot invitations (see Figure 1). The interviews lasted 30 to 90 minutes. We obtained prior verbal informed consent and background information from the interviewees and interviewed them in their homes or workplaces.

The interviews were audio-recorded, transcribed, anonymized, and subjected to individual coding using NVivo 11. We held a three-day analysis workshop in June 2023, during which we discussed the themes that arose during the interviews with other researchers on the team, and during which we determined that data saturation had been reached. Ethics approval for the study was obtained from the research ethics board of the College of Social Sciences and Philosophy, University of the Philippines Diliman.

Findings

Both as a valuable ethnographic finding in itself and as important context for what follows, we begin by enumerating the water sources we identified along the Marikina River and offer ethnographic descriptions thereof, especially as they relate to our interlocutors' water-related experiences. We then discuss people's embodied knowledge and practices related to knowing, sensing, and improving water quality.

Water sources and hierarchies

Overall, our informants shared the sentiment that water from various sources, including the river itself, used to be clean. But nowadays they have to resort to other sources—most commonly water-refilling stations, especially downstream—to have good water. “Mineral water” or “refill water” from these stations is generally considered the best drinking water and is the most commonly consumed. The terms refer to any kind of bottled water, whether distilled/purified (including brands like Summit, Absolute, Nature's Spring) or actual artesian water sourced from mostly foreign springs (Evian from France, Acqua Panna from Italy, Le Minerale—the cheapest—from Indonesia). The “mineral water” is sold in plastic or glass bottles (which typically cost 20–100 pesos or US\$0.40–US\$2, depending on the brand). Far more commonly, people buy water from refilling stations where a 20-liter container, including delivery, typically costs 40–60 pesos (the equivalent of US\$0.70–US\$1.09). Informants make little distinction among different kinds of bottled and distributed water, although some prefer the commercially sold bottled water for infants instead of the “mineral water” they buy from the water-refilling stations.


Some informants jokingly referred to such mineral water as “criminal water.” One, a 34-year old nail salon worker, used the term to cast doubts on its quality, especially when it was sold below its typical price (35

pesos [US\$ 0.63]). Others felt it was a “crime” that they had to pay sums representing a significant proportion of their income for water, which, as some recall, used to be free. Such misgivings aside, most of our informants trusted the refilling stations. Mineral water—with its attendant purification narratives or its industrial apparatus of metal containers, pipes, and valves—represents modernity and science: a view reinforced by water-refilling stations' and beverage-bottling companies' invocations of attributes like “alkalinity” and “pH,” as well as processes like “reverse osmosis” and “30 stages ultra filtration system.”

Some of our informants drink tap water (*mula sa gripo*; from the tap), also known as NAWASA (after the defunct government agency called National Waterworks and Sewerage System Authority) or “Manila water” (after the private company that now distributes water). Tap water is often first filtered: with a cloth wrapped around the tap; a commercial filter if one has been purchased and installed; or unfiltered, if they consider themselves accustomed [*sanay*] to tap water. People more commonly use tap water for other purposes, although not everyone has access to piped water. On a couple of occasions, people called tap water “criminal water,” alluding either to its high cost or its polluted state, especially in relation to “micro-network operations” (Cheng 2014) that redistribute water through their own plastic pipes or sell containers of water at a huge profit margin to neighbors who have no plumbing.

For some informants, another source is *tubig-poso* or water from deep wells. People usually consider this water unfit for drinking and only drink it in emergencies, but they use it for other things, especially bathing and cooking. This is less common now than in the past because access to tap water has increased and many deep wells have dried up, especially in highly urbanized downriver communities.

Meanwhile, in a *barangay* (village) in Rodriguez called Wawa, the community had no tap water but instead relied on a network of plastic tubes or hoses from a spring (*bukal*) inside a cave (villagers sometimes refer to the water as “from the hose”). In Wawa, people collect this spring water, which is rationed for one hour each day, in large plastic containers and use it for most purposes, with some also using it for drinking; others buy “mineral water” brought from downtown by tricycles. One family manages and maintains the water distribution from the spring, charging a monthly fee 200 pesos (around US\$3.6) per household, although some community members say the rights are disputed between a very



Pang-inom ng sanggol (For infants to drink)
Pang-inom ng bata (For children to drink)
Pang-inom (For adults to drink)
Pangsaing (For cooking rice)
Pangluto (For cooking other foods)
Panligo (For bathing)
Panghugas ng pinggan (For washing dishes)
Panlaba (For washing clothes)
Pangbanlaw (For rinsing clothes)
Pang-inom ng mga hayop (For animals to drink)
Pandilig (For watering plants)

Figure 2. .

rich family that allows them to source water from it and the government, which they fear might forbid them from doing so. Upstream from Rodriguez, such systems are likewise common.

Far upstream, close to the probable source of the Marikina River in the Sierra Madre mountain range, we visited a community—Malasya—where community members consider the river clean enough to drink, but even there, families used bottled water for infants and young children. Such a decision—to have one kind of water for adults and another for children—speaks to a hierarchy of use that most of our informants shared: one that can be plotted as a spectrum with demands for increasingly high water quality. While our informants understandably provided conflicting answers, we can nonetheless synthesize a cultural model of how different activities require different levels of quality from their responses (see Figure 2).

Crucially, while certain water sources are associated with particular purposes (tap water for cooking), people still regularly evaluated those sources. This is where sensing water quality come in, as we discuss below (see also Table 1).

Sensing water quality

Many of our informants used visual cues to assess water quality. Any change in color (*kulay*), murkiness,

or hint of mud (*putik*) are seen as signs that water from a particular source is of poor quality. For instance, people living in Wawa judge the river water to be dirty based on its color, as MG, a mother of three, said: “There’s a dam in Kasili, upriver. They say it’s a big dam. That’s where the mud comes from. So even if it’s not raining, the water is color brown” (35).²

People also used color to evaluate their regular water sources and to determine if they had become temporarily unclean, as TR, a farmer in Wawa, observed: “When it rains, it floods. The water turns brown, like vinegar. We don’t drink it. That lasts for around three days... but when it’s clear again, we can drink it again” (36).

Few informants mentioned gustatory attributes of clean or safe water, opting to say “normal” when pressed for how they think water should taste. Some, however, used words like *manamis-namis* (sweet) or *mala-gatas* (milk-like) to describe water (usually spring water) they considered superior in quality. They cited particular tastes like *lansa* (fishy), *kalawang* (rusty), or *mapakla* (bitter) to describe water deemed unfit for drinking. They usually characterized water from deep wells as having such strong tastes, invoking as reasons to avoid drinking it: “Before [we used to drink from the deep well]. Others still do. But sometimes it tastes *malansa* (fishy). The water is clear but it tastes like rust” (13). For NL, a water-refilling station employee in Pasig City, the presence of rust in the water—detectable only through taste—is the reason people source water from businesses like theirs: “If it’s from NAWASA, it’s automatic. You can expect it’ll be *makalawang* (rusty). That’s why it has to go through filtration. If you’re just gonna drink it without putting it through a filter, it can cause stomach sickness” (7). Beatrice, a sari-sari (variety) store owner in Marikina City, suggested that drinking water was a matter of habituation, which is why she and her husband drink from the tap, but why she buys “mineral water” for their 12-year old son: “If you’re already used to the refill [water] and you suddenly drink from the tap, you feel that it tastes *malansa* (fishy). Or it tastes *matabang* (bland) unlike the refill, which is *manamis-namis* (somewhat sweet)” (10). Another common taste is *lasang* chlorine (chlorine taste), which people living in downstream areas find especially bothersome. “They say it’s a disinfectant,” Kim, a government employee in Pasig City who buys water from a nearby water-refilling station, says. “But it’s still a chemical and it can’t be good” (3).

²Bracketed numbers at the end of quotations correspond to the numbers and the list of informants on Figure 1.

Table 1. Water sources for household consumption along the Marikina River.

Type of water	Local terms	Activities	Locations
Bottled water	mineral water, bottled water; sometimes also called by brand name (Absolute, Nature, Spring, Summit, Evian)	Drinking, especially by infants and young children	Along the river's entire length, more commonly downstream
Purified water	"mineral water," "refill"	Drinking, sometimes reserved for infants and young children, if the adults drink from the tap	Rodriguez and downstream
Tap water	<i>tubig-gripo</i> , NAWASA, Manila water, Maynilad	Drinking for some; for the majority reserved for cooking and washing dishes, unless filtered or it is an emergency	Rodriguez and downstream
Deep well water	<i>poso</i> , "deep well"	For most uses besides drinking, unless filtered or there is an emergency	All along the river, more commonly upstream
Spring water	<i>tubig-bukal</i> , <i>sapa</i> , "hose"	Drinking for some upstream communities; for the rest, reserved for activities besides drinking, unless a person is accustomed to it	Wawa and upstream
River water	<i>mula sa ilog</i>	Only for watering plants, but upstream from San Mateo people use it for swimming, bathing, and washing clothes; upstream from Malasya some also use it for drinking	All along the river

To a lesser extent than *kulay* (color) and *lasa* (taste), our interviewees also considered *amoy* (smell) a significant attribute for determining water quality. Many of the descriptions of the Marikina River's waters, for instance, were olfactory, such as *amoy kanal* (smells like a canal), *malansang amoy* (fishy smell), or *amoy na parang gamot* (smell like medicine)—the latter referring to chemical pollution. Kim also noted tap water's "amoy chlorine," further making her dubious of its quality.

Sanayan: embodying water relations

Bodily sensations were also seen as determinants of water quality. Itchiness (*katí*) was interpreted as a sign of pollution and as a reason to avoid bathing in river water: "Sometimes the water [in the river] is itchy because of the oil from the equipment from the "China tower" [e.g. the dam project associated with Chinese loans] upstream" (33). For drinking water the presence of gastro-intestinal symptoms (stomachache or *sakit ng tiyan*; diarrhea or *pagtatae*) was indicative of poor quality, otherwise generalized as "getting sick" (*pagkakasakit*). Unlike sensory evaluations that determine day-to-day water quality, illness experiences led to lasting decisions: "Once, I tried the water from the spring, but I got a stomachache. It must have been the sun, heating the plastic tubes. Since then, I avoided it. I just drink mineral water" (16).

While these embodied experiences may cause people to avoid certain kinds of water, our interlocutors also mentioned *sanayan*, or the idea that one can become habituated to something unpleasant or difficult—in this case, the water. We commonly encountered the notion that people can acclimatize to drinking polluted water, because their stomachs are tough (*matibay ang tiyan*) or because they grew up

with it. Even if one falls ill from the water, the body can adjust and become *sanay* (accustomed). For the same reason, people's bodies can adapt to a different water source. For instance, TR, the farmer who lived in Wawa mentioned above, grew up in a more upstream *barangay* [village] and said that it took him time to become used to "mineral water":

I'm used to our spring water in the mountain. The water tastes delicious especially if freshly sourced from the well. When we arrived here [in Wawa], of course we ended up buying mineral water, but it affected my stomach at the beginning (*naninbago*). Eventually, our stomachs got used to it (*nasanay*). Even now, when I got back to the mountain, I drink the spring water (36).

Being used to water is mostly described as a function of being habituated to a certain place or a certain water source. But it is also associated with poverty and hardship. Meanwhile, the ability to discriminate between kinds of water is seen as a matter of relative privilege. As AR, a construction worker from Marikina City, stated: "I just drink from the tap directly. It doesn't have an effect on me. We are poor and must get used to what's given us (*dapat masanay sa kung anong meron*)" (1).

This same *sanayan* logic explains why infants and young children—who have not had time to habituate to life itself—are viewed as having weak bodies and are given purified or, in some cases, even bottled water. As MC, a construction worker in his mid-twenties living in Manggahan explained: "We don't boil the water. We just drink it as is. But for the children, we buy mineral water from town. It's for my son ... - others who have *maselan na sikmura* (sensitive stomachs) also drink mineral water" (14).

Many other informants echoed this, like a sari-sari store owner in Malasya who said that her family buys

mineral water for the children. “And of course,” she adds, “when there are visitors, we serve them with mineral water” (44): a practice driven not just by the desire to be hospitable, but also by the assumption that visitors are *hindi sanay*, that is, not habituated to the water that her family typically consumes. In our informants’ narratives, water quality emerges as a relational concept, in which knowing one’s body (and those of others) contributes of the entire suite of “knowing.”

Other-than-human sensing

Beyond bodies and senses, effects on other species are also considered indicative of water quality. People see the presence, size, population and variety of fish, for instance, as measures of the river’s health and water quality: “It’s because of the chemicals. That’s why the fish dwindled in number. Unless the river swells, in which case the fish go back” (10). How fish taste, for instance, is seen to signify the quality of the water where it was caught. Some of our interviewees told us that if it has *lasang gilit* or *lasang gilik*, which loosely translates to “muddy taste,” suggesting that the fish is contaminated or *hindi na sariwa* (no longer fresh) (8). In the most upstream community our research team reached, residents cited the presence of fish as well as *palos* (eel) as evidence that the water was clean, in contrast to the rivers in Metro Manila, where “there is no longer any life” (44).

Upstream communities also cited the presence of animals drinking from the river—such as wild boar and monkeys—as evidence of *good* water quality. For downstream communities, by contrast, janitor fish, described by some as “monsters” and *pangit* (ugly), were evidence that the water was dangerous, or, in the words of RI, an entrepreneur in Marikina City, *lason* (poisonous) (28). To a lesser extent, people viewed vegetables and water lilies growing in the river as signs of life, but perceived their pollution-mitigating effect as limited to making their own leaves (for the vegetables) safe for human consumption. One informant, who lived in an informal Marikina City settlement, referenced the notion of a natural cleansing cycle: “It’s okay to eat vegetables even when the water is dirty and when there’s chicken manure all over. Like a cycle, things around the world, they have a way of circulating so it’s okay” (24).

Finally, at least a few of our informants used everyday objects to measure water quality. For example, laundry washers referred to the discoloration of white clothes as an indication of something wrong with the water. People used sensorial attributes—via their senses

and embodied experiences or indirectly through other things—to measure day-to-day changes in water quality.

Making water quality

When people determine water quality to be poor, they take action to make it good enough for themselves and their families. Most often they purchase “mineral water” from water-refilling stations, which many of our informants trusted. However, they also make trade-offs, especially due to financial constraints, including only giving young children bottled water which they consider safe.

We documented the means by which people make sources of water they view as “less clean” into acceptable. Filtering with a cloth—*sinasala ng tela*—is one such method. This involves running water through a cloth before drinking or washing with it. Some people, especially downstream, attach filters to their taps. Costing 1000–2000 pesos and readily available in online platforms like Shopee and Lazada, these filters are seen as inexpensive alternatives, albeit still inferior to “mineral water.” Some boil water, especially if there is no mineral water available. AR, a resident of a downstream community in Marikina, stated:

The water in the deep well, it has a peculiar taste. It tastes like rust when you drink it. You need to boil it first. If you don’t, it tastes like rust... This is unlike tap water, which you don’t need to boil because it doesn’t have a taste (1).

The temporality of practices around water quality stem from an acknowledgment that water quality is always in flux. Some Marikina City residents reported avoiding tap water late at night or in early morning, saying it is “already stuck;” in contrast water in the daytime has greater flow. Conversely, in Wawa, some think that cooler temperatures at night make the water cleaner, while too much heat in daytime can cause the plastic water tubes to leak contaminants and the water “tastes like plastic.” In communities even farther upstream, people simply wait for the water to “rest” or “settle” overnight before consuming it.

Informants also mentioned ad-hoc or exceptional practices during times of crisis. A mother living in San Mateo reported that her entire family—including the children—had become used to *nasanay* (tap water). However, when there is a flood, they buy “mineral water,” citing the risk of diseases like diarrhea and amoebiasis. However, in general, people simply buy from refilling stations, which, as we have already indicated, most of our interlocutors accept as providing good enough water.

Conclusion: challenging policy flows

Throughout our interviews, water quality emerged not as an absolute, stable property but as a dynamic bound by embodied, social and temporal relations. Far from a passive recipient of water, people saw their bodies as active in settling the question of good water, or sometimes, nullifying the significance of quality (when the body was already acclimatized). Our key finding is that people can become *sanay* (used) to certain types of water and develop “resistance” to the risks associated with them, in line with the *resistensiya* Filipinos invoke to make sense of illnesses, including COVID-19 (Tan and Lasco 2021). The concept of *san-ayan* resonates with (and may well be an example of) what Shapiro (2015, 378) calls “sustained bodily reasoning,” or how people embrace “relational-cum-epistemic utility” to detect or live with chemical exposures. What we observed along the Marikina River constitutes an “embodied ecology” (Ford 2019, n.p.), in which bodies are not bounded entities, but subjects in fluid relations with the environment.

In pragmatic terms, this embodied relationality—along with the idea that plants can filter water and therefore vegetables watered by the river are “clean”—should remind policymakers that various water sources receive different evaluations depending on their purpose and intended recipients (infant, adult, plant). Deliberate messaging is required to convince people of the risks and dangers of particular water sources, if they think they are accustomed. This is especially pertinent since the stated directions of the country’s latest water policy formulations, which focus on water security (Official Gazette of the Philippines 2023) do not include communicating with or learning from consumers.

Applying what we know about water quality in the Philippines today, we can see that people’s “situated expertise” (Radonic 2023, 235) and “experiential knowledge” (Linn et al. 2023, 270) may not suffice to protect them from what Nixon (2011) describes as “slow violence.” Scientists and activists now express growing concern about micro- and nano-plastic pollution of the world’s waterways. However, the extent to which discrete objects (plastics) infiltrate and chemical pollutants leach into water has not yet been defined as a problem in the Philippines. Nor has pollution by forever chemicals such as PFAS and persistent chemicals used as pesticides and herbicides (Prudente, Malarvannan, and Tanabe 2007; Baluyot, Reyes, and Velarde 2021; see Paredes 2021 on chemicals on a Southern Philippines’ banana plantation). Thus, in addition to what our interlocutors find visible and

actionable, they also face violence that is not only “slow” but also “invisible” (Walters 2014).

Given that such risks and harm are beyond ordinary people’s ability to detect or address, national and local governments - in the Philippines and elsewhere - should proactively monitor the quality of each water source, as well as the efficacy of people’s practices—from home-based filters to storage in water drums—to make water cleaner and safer. The Marikina River itself is officially a Water Quality Management Area, which undergoes regular testing and is subject to strict regulation (Republic Act 9275). However, “overlapping of institutional boundaries, duplication of work and a lack of coordination between involved institutions” (Japitana et al. 2018; see also Rola et al. 2015, 2016) undermine water quality monitoring, and the country’s limited monitoring efforts have focused on bacterial quality. This approach results in problematizing households rather than corporations.

Such regulatory vigilance is particularly important for water-refilling stations, in light of their extreme popularity and importance that mirror settings like India and Indonesia (Kumar et al. 2021; Bakker 2007). Our interlocutors seem to exempt these water providers from the same assessments of quality they apply to other water sources. This is a reminder that beyond sensing the water, consumers’ evaluations of water quality are also a matter of trust or distrust (see De França Doria 2010; Brouwer, Hofman-Caris, and van Aalderen 2020). What Radonic et al. (2022, 7) write about Flint, Michigan holds true for the Marikina River: “regardless of the physical characteristics of the water in their individual households, everyone described with shock and dismay public officials’ early assurances that the water was safe to drink.” Tellingly, a 2022 inspection of 95 water-refilling stations in a Philippine city found that only 68 possessed up-to-date bacteriological tests, only 44 had physical chemical tests, and only 35 possessed actual sanitary permits (Antonio 2022). The uncritical embracing of water-refilling stations can extend to scholarship: previous scholars of water (e.g. Mason 2012) accept that the stations offer good (or better) water without questioning its actual quality.

Moreover, that our informants—most of whom are economically challenged—spend time and money to buy or avail themselves of good-quality water speaks of how, in the words of Ennis-McMillan (2001, 385), “water-related bodily distress results from the intersection of local experience with broader structures of inequality.” As Linn et al. (2023, 267) put it, having to purchase bottled water for infants or “get used to”

unsafe water constitutes a neoliberal responsabilization that involves “new water-use norms and practices” in a context of embodied risks and harm and mistrust of water suppliers. Such observations link water quality with water justice and underscore what is at stake in “ethnohydrology” (Gartin et al. 2010).

On the macro level, the question of who is responsible for the polluted state of water is largely obscured in our responsabilized informants’ day-to-day water dilemmas. Likewise, how to render visible and actionable the slow or invisible violence from which people suffer as a result of chronically poor water quality remains an unresolved but vital question. Addressing this will necessarily entail “not only an understanding of the experiences of crisis at the level of individuals and communities,” but also “the historical foundations and effects of contemporary processes of state harm and structural inequality” (Linn et al. 2023, 270; see also Velásquez 2022). In Metro Manila, as in the rest of the Philippines, a “politics of cleanliness” has entailed superficial changes to the environment that does not address industrial and structural sources of pollution and environmental harm (Saguin 2022; Ballesteros 2010), which Sultana (2020, 1408) calls “embodied intersections of sociospatial difference.”

In ending, it is worth asking what “following the water” has accomplished for us – what analytic dividends has it offered? The river itself is not a significant water source along much of its path. Its uses are limited save for very far upstream communities. However, the river demonstrates a clear gradient of water quality and security. The upstream communities are farthest from urban economic opportunities. They are able to easily access good quality water from the river and other sources (such as springs), if not for drinking, then for various other uses (bathing, washing clothes). Downstream, communities have plenty of water sources to choose from and presumably more economic opportunities (which is why many migrated downstream in the first place; see Shatkin 2009). But the cost—in terms of time, energy and money—of accessing water is demonstrably higher for them.

Our focus on water quality may have caused us to pay scant attention to the “non-use values” (Dayo et al. 2018) of the river: its symbolic, social, and aesthetic significance, as well as its socio-spatial potential, which are contingent on the river being deemed clean or polluted. Moreover, while we have followed the geographic end of the Marikina River, there is a much higher, more illuminating, and more elusive political and economic “upstream” that is a greater determinant of what happens downriver. While writing this article, the Philippine government

declared a “water emergency” (Official Gazette of the Philippines 2023), signaling an even more water-insecure future for our interlocutors. If, as water scholars have forcefully argued, “knowledges and values of all stakeholders must be accounted for in policy decision making” (Wilfong, Paolisso, and Trombley 2023, 201), then the work of interrogating and challenging underlying hydro-social processes (Boelens 2014; Boelens et al. 2016) must continue alongside our interlocutors’ search for water that is good enough.

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