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THEMATIC CLUSTER: THE FUTURE OF FACTS IN LATIN AMERICA  OPEN ACCESS



The persistence of long facts: truth and consequence in Costa Rica's aquifers

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ABSTRACT

At the center of decades-long water conflicts in northwest Costa Rica, a particular fact has had a contentious status: whether the aquifers supplying the area hold sufficient water for collective life. I refer to this as the *sufficiency fact*, which has been established, debunked, and reestablished multiple times. To understand this peculiar dynamic, I zoom into discussions among community and business representatives about the future of these aquifers. There, in the density of social life, I show how as place-specific formations, facts are “long” entities that remain tied to their interpretations and, crucially, to their potential consequences. As opposed to the ideal of short facts that characterizes modern science, long facts reveal the rich social life that facticity takes in the twenty-first century. Long facts are always contested, explicitly political, and unable to be separated from their potential consequences. In contrast to scholarship that diagnoses the loss of the value of truth within the contemporary moment, I suggest it is critical to understand the abundance of regimes of facticity that surround us and what they make possible leaving behind assumptions of deficit and lack.

A persistência dos fatos longos: verdade e consequência nos aquíferos da Costa Rica

RESUMO

No centro de décadas de conflitos pela água no noroeste da Costa Rica um fato específico tem tido um status contencioso: se os aquíferos que abastecem a área contêm água suficiente para a vida coletiva. Refiro-me a isso como o fato da suficiência, algo que foi estabelecido, negado, e restabelecido diversas vezes. Para compreender esta dinâmica, analiso as discussões sobre o futuro destes aquíferos entre representantes das comunidades e das empresas turísticas. Ali, na densidade da vida social, mostro como os fatos são formações de um lugar e de um tempo específicos. Refiro-me a isso como “fatos longos,” os quais permanecem vinculados às interpretações e, crucialmente, às suas possíveis

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PALABRAS CLAVE

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consequências para a vida social. Ao contrário do ideal de fatos curtos que caracteriza a ciência moderna, os fatos longos revelam a rica vida social que a facticidade assume no século XXI. Os fatos longos são sempre controversos, explicitamente políticos e incapazes de se separarem das suas possíveis consequências. Em contraste com estudos que diagnosticam o momento atual como de perda do valor da verdade, sugiro que é essencial compreender a abundância de regimes de facticidade que nos rodeiam e o que eles tornam possível, deixando para trás pressupostos de déficit e carência.

La persistencia de los hechos largos: verdad y consecuencia en los acuíferos de Costa Rica

RESUMEN

En el centro de décadas de conflictos por el agua en el noroeste de Costa Rica ha estado el estatus de un hecho particular: si los acuíferos que abastecen el área contienen suficiente agua para la vida colectiva. Me refiero a esto como el *hecho de la suficiencia*, algo que ha sido establecido, desacreditado y restablecido varias veces. Para entender esta dinámica, analizo las discusiones entre un representante de comunidades y uno de empresas turísticas alrededor del futuro de estos acuíferos. Allí, en la densidad de la vida social, muestro como los hechos son formaciones de un lugar y tiempo específico. Me refiero a estos como “hechos largos,” los cuales permanecen ligados a interpretaciones y, lo que es más importante, a sus posibles consecuencias para la vida social. A diferencia del ideal de los hechos breves que caracteriza a la ciencia moderna, los hechos largos revelan la rica vida social que toma la facticidad en el siglo XXI. Los hechos largos son siempre controvertidos, explicitamente políticos e incapaces de separarse de sus posibles consecuencias. En contraste con las corrientes que diagnostican el momento actual como uno de pérdida del valor de la verdad, sugiero que es fundamental comprender la abundancia de regímenes de facticidad que nos rodean y lo que estos hacen posible dejando atrás supuestos de déficit y carencia.

1. Introduction

One night in early 2017, a person whom newspapers called a “*vándalo*” (“vandal”) found their way into the well that supplied water to residents and businesses in a coastal town in Guanacaste, on Costa Rica’s Pacific coast. According to news sources, the person poured rocks, sticks, and debris into the well with the intention of making a point: people had run out of patience and either government representatives needed to take their demands seriously or the confrontation would escalate even further. It was never clear who that person was, but it was well known that people in the area had dealt with inconsistent water service and rationing for years. Despite this, tourism establishments continued to proliferate, green lawns expanded, and sprinklers multiplied, propelling scarce water into the air to keep lawns lush in the dry tropical landscape of the Pacific coast. The images of manicured gardens and endless golf courses set against the dry landscape scratched the senses. They were, and continue to be, evidence

of the dramatic effects that expats and tourism-enclaves have in the coastal towns they colonize.

Responses to these conflicts were multifarious. They included stationing police officers by wells until locked gates were installed, establishing multi-sectorial commissions, and, most importantly, ordering scientific research to establish basic facts. Government officials hoped that establishing whether there was enough water in an aquifer – turning it into a techno-scientific fact, ideally a short binary determination of *there is* or *there isn't* sufficient water – would settle the situation, even if it would not resolve all conflicts. Communities, technical agencies, and activists shared that hope to some degree. They hoped that establishing the sufficiency fact would bring clarity and alleviate decades of struggle.

In one coastal town, conflicts had intensified around the turn of the millennium when a mega-hotel planned to drill new wells to satisfy the thirst of its business model. A group of communities came together “to resist the theft of their water” (Angulo Angulo [n.d.](#)). One of the movement’s leaders, an elementary school teacher who would later become a well-recognized politician, organized 13 neighboring towns against the hotel’s plans. With the support of activist, environmental, university, and religious organizations, the community’s resistance became iconic of a new era of conflicts around water in Costa Rica.

During the next two decades, the pressures on aquifers continued to intensify amid skyrocketing tourism rates. Beaches and hotels attracted more and more tourists, expats, and celebrities. The question of whether there was sufficient water persisted, as did local mobilization against tourism development. Over time, community aqueduct associations – the bodies managing water infrastructures and supplying users – went from modest neighborhood groups to powerful gatekeepers. Holding authority and infrastructural control, aqueduct associations were targeted by developers who claimed they halted investment and job creation. For many, however, these organizations were the last safeguard against water depletion.

In this context, determining whether there is sufficient water in an aquifer is a particularly complicated matter. It entails combining scientific knowledge, legal regulations that prescribe who is served by an aqueduct, technical assessments of water abstraction, future-oriented speculation over who should have access to water, visions of how a region should look in years to come, and more. The dream of producing sufficiency as a short determination – there is enough water or there is not – would be that, a dream. As Daston ([2001](#)) explains, short facts are self-evident, autonomous, and concise. They carry information that can move efficiently across time and space. Short facts can function as evidence of a variety of propositions, but they are supposed to differ from theory or interpretation. Overall, short facts are “strictly independent from this or that explanatory framework” (6). Short facts are constrained bits of worlds, existing in a binary register of empiricism evaluated on the basis of truth or falsity.

Ultimately, as it would become clear in the years that followed the hotel conflict in Guanacaste, people were very aware that a short fact would not solve their water issues. Sufficiency could never be disconnected from interpretation; sufficiency was a material condition through which everyday people experienced but also theorized collective life. Water sufficiency remains much more complicated than a binary determination. It is another kind of fact, one that I will refer to as a long fact. This paper explores long facts by contrasting them with short facts, and outlines a regime of facticity that started taking

form during colonial times. A factual regime consists of a set of ideas and practices of what facts are, how they can be built, how they can be used, and what dissolves them. These ideas are sometimes tied to formal institutions such as scientific research centers or courts, but sometimes they are not. A factual regime often cuts across social institutions and manifests in what people take for granted as truth as much as in the rules of evidence within science or law. As I will show, in the factual regime of long facts what matters are consequences, and both facts and consequences remain linked to the power structures that establish them.

As units in this regime of facticity, long facts are more than taken-for-granted pieces of knowledge about the world that travel seamlessly. Long facts keep in focus both the process of their production and the consequences they unleash. They inherently entail the interpretation and theorization of their implications. Long facts are facts on the street, known to be subject to the push and pull of social life and, for that reason, acknowledged by everyday people in terms of how they matter and for whom. Rather than tokens of truth or proof of an external reality, long facts are true and real because of how they affect people's lives, because of how they condition the world. I have learned about long facts through more than two decades of research examining water as a political substance that refracts questions of rights, profits, science, and space (Ballestero 2012, 2019a, 2019b, 2023).

To outline the nature of long facts, I draw from ethnographic research with public officials and local residents who came together to discuss sufficiency in the context of a multisectoral aquifer commission (AC) created by the government in response to one of the water conflicts I described above. I have been in conversation with participants in this AC – local residents, experts, business owners, and public officials – since 2021, learning how they share information, coordinate water management, struggle with each other, and sometimes make decisions about appropriate water use.

The rest of this paper juxtaposes short and long facts within the micropolitics of public discussions in this commission. I offer this contrast as an analytic device more than an ontological binary. As modalities, long and short facts are not necessarily exclusionary. A fact can start its life as a long entity, later be shortened, to then become elongated again. Long and short facts can also coexist in the same social space. To develop these ideas, I start by briefly comparing two historical moments that represent two genealogies of fact-making. One is tied to North Atlantic histories of science, for which short facts become the gold standard. The other is a colonial-era Latin American tradition of long facts, in which facts are grounded in the legal acts of Empire-building. I then return to the AC to show how the length of the sufficiency fact matters for its participants. My interest here is to bring to our attention small moments of fact use, rather than moments of fact production. This allows me to outline a pragmatics of facticity shaped by significance and consequence, what I explore through the analytic of length.¹ I end by reflecting on what the notion of long facts, as it operates in Costa Rica, offers to an understanding of truth claims for our times.

¹There is a strong affinity between my approach and William Joyce's pragmatist understanding of truth. While I cannot fully develop those connections here, I want to acknowledge one reviewer for suggesting a more systematic exploration of this affinity in the larger project this paper is a part of.

2. Of short and long facts

Establishing the fact of whether there is sufficient water in the Guanacaste region of Costa Rica might seem a straightforward project. One could determine the current volume of water an aquifer holds and compare this to the region's needs. This information could be translated into an extraction rate, a mathematical calculation conveying how much water can be drawn from an aquifer without depleting it. Sufficiency, here, would be a quantity that does not require extensive histories or geophysical descriptions to matter. Sufficiency would be kept as a short fact.

Short facts establish truth by fragmenting "the continuum of experience into a mosaic of particulars" (Daston 2001, 16), such as a particular quantity of water in the continuum of environmental and economic life in Costa Rica. Any implication of that quantitative figure for social and environmental well-being is shaved off from the fact itself and understood as an external consequence. This is because short facts are "immiscible with opinion, interpretation and theory" (Daston 2001) and are taken as autonomous and concise bits of worlds (Morgan 2011).

Decades of STS scholarship have shown that, in practice, facts are never those autonomous, taken-for-granted entities (Latour 2004; Marres 2018; Radin 2019). That does not mean, however, that the idea that facts are compact, self-sufficient, and detached from both the conditions of their production and the consequences they unleash has faded. The doctrine of short facts remains a foundational ideal of modern science and in recent years, a praised value in the context of misinformation and the debilitation of expertise in society. The idea of facts as short entities saturates ideologies of truth and reality that follow from Western secular metaphysics.

In the history of European thought, short facts emerge from the encounter between law and history in medieval Europe. At the time, facts were historical happenings worth recording to be compared with legal principles, out of which the ultimate truth of events would be determined (Shapiro 2000). A similar relation was also established in accounting practices and double-entry bookkeeping technologies, with a distinction between species (historical events) and genre (general principles). In that instance, the "discrete particulars" of a merchant's everyday commercial practices (species) were evaluated against universal principles of godly action that were theologically determined (genre) (Poovey 1998). But it was in North Atlantic histories of science that shortness became institutionalized as a value to be cultivated. In the seventeenth century, Francis Bacon defined facts as deracinated entities that could withstand movement, serve as evidence for theory, and have a succinct form (Daston 2001). Facts were all species, particulars in essence. Bacon intentionally distinguished facts from matters of interpretation and opinion, drawing on his own legal background. By the nineteenth century, positivism had settled on the permanence and stability of facts, as opposed to interpretation and theory. From there, although not without controversies, modern science took facts as tools to describe and catalogue nature. These facts existed independently of the history of their production and their future implications. In opposition to systematic exposition or theoretical claims—forms of knowing that both required extensive description and interpretation—short facts were easily collected, turned into tables and lists, and moved widely in published form. By the twentieth century, the notion of scientific facts had sedimented around short entities as a means to provide stability to reality (Hagen 2019; Latour 1993; Shapin and Schaffer 1985).

While the twenty-first century began with an implicit public acceptance of short facts as the gold standard of truth, misinformation and “alternative facts” have rocked the public sphere in many places around the world – not the least in Latin America. Heated discussions about the politics of techno-scientific facts and their circulation outside of scientific institutions (Cabañes, Anderson, and Ong 2019; Cesarino 2022) (Castro this volume) now need to address the role of passions and interests in the making and stabilization of truth. In this political context, other ideas about facts beyond the deracinated units of Baconian science have begun to take hold in the public sphere. Citizens and journalists publicly discuss not only how the social world is imbued in the production of truth – e.g. vaccines are produced by pharmaceutical companies with a vested commercial interest – but also the relation between fact and consequences. Facts have become entities with histories and futures that matter in everyday life; it is those entities that I refer to as long facts.

The long fact is explicitly connected to interpretation, history, and consequence. Long facts are not autonomous happenings in the form of pieces of information that can travel endlessly – they are not deracinated. To the contrary, they bear the marks of the conditions of their production (e.g. who produced them, where, and how) and wear their potential consequences on their sleeves. This means long facts remain connected to particular historical and geographical locations, as their significance depends on how they matter for particular groups of people, not on whether they ultimately prove abstract truths.

In Latin America there is another genealogy of facts likewise characterized by such extension. In this tradition, the relation between law, authority, and fact that people like Bacon worked to excise remains within facts. This tradition goes back to colonial times when the authority to establish a fact was unequivocally tied to the legal administration of empire (see also Gómez this volume). At that time, the Crown appointed specific individuals with the authority to certify facticity (Barrera-Orsorio 2006). Those individuals produced reports based on empirical observation and proceeded to certify legal matters, technological innovations, and medical and botanical knowledge (Bleichmar et al. 2009). They also certified matters of personal life – questions of property and family – and were, in theory, supposed to provide their services to all subjects, including “*los pobres de solemnidad y los Indios*” (“poor and Indigenous people”) (Valverde Hernández 2016, 13).

The individuals authorized to certify truth were known as notaries and held the authority to determine the reality of religious, private, and public affairs.² Individuals could become notaries as long as they knew how to properly write in *castellano*, acted on their own name, and exhibited a good character – meaning they were reserved, a good Christian, of good reputation, and of a particular location so that they were acquainted with matters of the region and the repercussions their certifications would have (Valverde Hernández 2016). In other words, notaries were charged with creating recognizable truths regarding all matters, personal and public, based on the translation of their personal characteristics into forms of administrative and political authority to ultimately shape public and administrative matters. Who the fact-maker was mattered

²Some of the conquistadores were notaries themselves, conflating violence, truth-making, and legal authority within one individual. Later, military authorities and mayors also performed these functions.

greatly for how a fact was constituted, and this was plainly recognized by those who required the notary's services.

To achieve factual recognition, notaries produced narrations of the continuum of social life. Their reports transformed events in the streets, fields, and forests into official facts. Those narratives were extensive, documenting locations, dates, objects, and people in concrete legal and political terms (e.g. who is entitled to a particular plot of land, what the effects of a particular balm are, who is entitled to benefits from a transaction, who is related to whom, etc.). The notary's job was to give those extended happenings the "appropriate [textual] form," bestowing "the messy species of each event [with] the proper form to be committed to the page" (Burns 2005, 352). That proper form, in contrast to the short fact that would emerge in modern science, was lengthy in form and consequence. It required detailed identification and interpretation of the character of interpersonal relations, historical happenings, mobile and immobile assets, institutional locations, communications between parties, broken promises, conflicts, and more. The narrations of these events embodied theories of kinship, political authority, religious piety, and natural causality. For these kinds of facts, event, interpretation, and consequence were bundled. They coalesced into the official truth. Of interest here is not only that the empirical content of those reports benefited colonial powers materially and politically. Additionally, those accounts created an administrative regime of truth-making, an institutional architecture of objectivity, that made detail and context intrinsic to certifiable empirical knowledge.³ These are the foundations of what I think of as the regime of long facts.

Considering how the raw material that notaries worked with was the lived experiences of those requiring their services, the facts they proclaimed along with their implications were not foreign to everyday people. While a kind of alchemy happened behind the closed doors of the notary's office, the origins and implications of facts belonged to more people than the notary himself. People knew, or could envision, the histories and precedents of a notarized fact, as well as its immediate effects for themselves and the Crown – for example, establishing a kin relation would have consequences for inheritance, or locating a patch of plants would shape who could access it. People were firsthand witnesses to the power of the notary to establish truth, but they also knew of the histories, negotiations, arbitrations, and conflicts occurring within and beyond the notary's office. Put differently, facts were neither dissociated from the worldliness of their production, in terms of hierarchies and political struggles, nor from their implications for the parties, the Crown, and emerging publics.

Unlike the tradition of modern scientific facts predicated on the modesty of observation behind the closed doors of the scientific society or laboratory, notarized facts were visibly linked to the life of colonial publics, existing conflicts over authority represented by the notary, and the Crown's needs. Hence, these facts were always contested or contestable and uncontrollably expansive by way of their consequences near and far. With the persistence of notary-like figures as fact-makers of daily life, from colonial times to the present, the connection between truth-making and administrative authority remains a lively condition of life in Costa Rica. Embodied in all the facts of life that

³My point is not merely to, once again, show that facts are constituted through social relations. That is, in effect, a point I take for granted. My argument is that what a fact unleashes, as a participant in social life, is part and parcel of what a fact is, once we move away from disembodied evaluations of their truthfulness and leave behind normative assumptions of shortness.

administrative authorities and other state representatives continue to produce, the truth continues to be inseparable from its consequences (Valverde Hernández 2016). Here, facts are not valuable due to their metaphysical truthfulness. They are messy, used in the asymmetric and convoluted conditions of everyday life, and valuable because of their implications. These are the long facts of daily life that exist within a regime of facticity which people enact in their immediate contexts.

3. A long fact in a time and a place

People in Costa Rica are skilled observers and users of both short and long facts. Among them, facts with a techno-scientific basis that directly impact daily life are seldom taken as contained or universal truths. Water sufficiency, for instance, has been at the center of decades of conflicts in the country (Alpízar Rodríguez 2014; Bonilla Bonilla 2020; Mora Portuguez and Dubois Cisneros 2015; Navas and Cui 2015; Solís Montoya and Zúñiga Navarro 2019).⁴

At a national level, water sufficiency is turned into an administrative matter by the Environment Ministry. As state representatives with the authority to certify environmental facts, technical personnel from the Water Department calculate how much water an aquifer holds in order to determine an appropriate water extraction rate. To accomplish this, they work with two figures. The first is the *maximum* extraction rate, a number that represents the upper limit of how much water can be drawn from an aquifer without depleting it (in the example I offer below, 180 l/s). This number is a ceiling, an upper limit intended to guarantee the sustainability of an aquifer as it only authorizes people to extract the amount of water the aquifer would recover through rainfall. Scientific studies could move that maximum up or down, but such studies are expensive and seldom conducted by government agencies.

The second figure that the ministry relies upon is the *actual* extraction rate, a number that reflects how much water users are currently drawing. At the time of my research, people were drawing 80 l/s, a quantity that was significantly smaller than the maximum rate of 180 l/s. The ministry acknowledged how 100 l/s of water, theoretically usable, was being left in the ground. From the perspective of short facts, there was sufficient water, given that the difference between maximum extraction and current extraction was significant (100 l/s). That 100 l/s of water seemed to be a concise bit of the world requiring little to no interpretation or theorization.

3.1. The numeric form of the sufficiency fact

And yet, my ethnographic work with the AC shows how things are never as clear as they seem. To determine water sufficiency, one certainly needs to know how much water is in an aquifer and how that water is currently used, but such information, even if it could be

⁴As a concept, sufficiency shares semantic space with notions of water scarcity and water insecurity, which have been adopted by United Nations organizations as frameworks for action (Jepson et al. 2017; Wutich and Brewis 2014). While security and scarcity have been used to understand household and individual water conditions, sufficiency, as deployed by my interlocutors, refers to a broader and more diffuse vision of a good collective life that includes, but is not measured in terms of, water access at the individual or household level. Sufficiency speaks to the social life of water in circumstances where you share geographic and social space with all sorts of actors, including those with opposing interests or views on what constitutes a good life.

precisely established, is not enough. The calculation of water quantity requires a broader form of sense-making that places its materiality in the context of ideas of a good collective life (Jones 2006; Porter 1992; Robbins 2013). This number requires theorization and interpretation to be meaningful and to matter as a fact (Figure 1).

Namely, in Guanacaste, those interpretations revolve around the proper usage of water in this historical and geographic context and to what extent that water enables people to live good lives. Some theorize a good life by way of tourism investment and real estate development. For others, a good life hinges on curtailing the extractive power of the tourism industry and preparing for a future of water scarcity. Both visions reflect the structural transformations the extractive tourism economy has brought to Guanacaste, albeit in opposite ways. Those different views coexist in neighborhoods and towns, held by people even living next to each other. As Pacheco-Vega (2020) shows, in places where the tourism industry creates deep asymmetries water issues need to be understood at a micro scale, beyond dominant frameworks such as the watershed model. Any analysis of water sufficiency needs to be sensitive to micro-level differences whereby, for instance, a luxury home sits next to a multigenerational, low-income household. Those differences are not merely contextual but determine how facts matter and for whom.

The influx of tourism capital in the last 40 years has structured how and for whom water flows in Guanacaste. Consider the following sequence of events: shortly after the mobilization against the mega-hotel described in the Introduction, communities brought a series of lawsuits to the Constitutional Court that halted the project on the basis of limited water availability; the local municipality banned new construction for the same reason; the same municipality backtracked on its decision because, according to the media, they “succumb[ed] to the pressures of developers;” the country’s largest utility and the mega-hotel established a partnership to build a new aqueduct; a multiyear monitoring program was created to determine if there was sufficient water in the area; Guanacaste experienced the most severe drought on record from 2014 to 2017; a new study determined the aquifer holds sufficient water for new developments; a presidential decree established an Aquifer Commission, the AC, to deal with the problem of water

Sufficiency-Fact as a Quantitative Question

Maximum Sustainable

Extraction Rate: **180 liters per second**

Actually Authorized

Extraction Rate : **80 liters per second**

Difference: **100 liters per second**



This quantitative difference is the numeric form of the **sufficiency-fact**

Figure 1. Sustainable extraction rate/community extraction rate.

scarcity in the region; a mega water tank was inaugurated in 2019 to send water to coastal communities affected by drought; and a new president promised to remove all obstacles to private investment in Guanacaste, arguing there is sufficient water. But this story has not ended. It continues to unfold. One of the sites where this can be seen most starkly is the aquifer commission, a collective body where people rely on different forms of techno-scientific knowledge (e.g. engineering, hydrogeology, climatology, law, planning) to push forward different visions of how the materiality of water shapes the meaning of a good life (Callon, Lascoumes, and Barthe 2009).

4. Facts as truths with consequences

The AC I have been following the past few years includes people directly impacted by water (e.g. business owners, local residents, municipalities, state agencies, community aqueduct organizations, and investors) in addition to elected officials and representatives of the central government. Within the multiple discussions happening in the meetings, the interactions I narrate below between two members help us see the extension of facts in daily life.

The first AC member I want to introduce is Jürgen, a Northern European expat who arrived in Costa Rica more than 40 years earlier. For decades he owned a restaurant in a popular beach town that is now saturated with luxury establishments and homes. Jürgen represents business owners in the AC. He is one of the founders of Guanacaste's Tourism Chamber, an influential body that lobbies for better business conditions.⁵ At the commission meetings, Jürgen leans towards confrontation, though after many years of interacting with him people have become accustomed to this. When given the floor Jürgen speaks at length, repeating his favorite phrase: "*¡Agua hay y en paleta, las instituciones son el problema!*" ("There is water, and plenty of it, the problem are public agencies!"). Without exception, at every meeting, Jürgen repeats this statement. For him, sufficiency is not about water quantity but institutional (in)adequacies. For Jürgen, a good life includes extracting more water so that more investment and tourism can flow in.

The second commission member whose vision is noteworthy is Federico. He was born and raised in Guanacaste. After several jobs fishing, farming, and cattle ranching, these days he takes tourists out on sport-fishing tours. Federico is the president of his hometown's aqueduct association.⁶ Effectively, community aqueduct associations control whether small hotels, family homes, gated communities, and businesses can establish themselves in an area, as these associations grant the water connections needed to operate. Federico has been involved in environmental issues for decades and has an extensive record of training courses provided by NGOs, the state, and public universities.⁷ During AC meetings, Federico weaves environmental thematics

⁵In 2005 Jürgen led efforts to transform the small regional airport into an international port of entry, exponentially increasing the tourism industry in the area. By 2019, 1.1 million people, virtually all international tourists, arrived in Guanacaste's airport seeking beaches and resorts. In sum, Jürgen has been a major business player in the region.

⁶Originally intended as local counterparts to the developmentalist state, today these associations are under great pressure from developers who need water availability letters from the associations to obtain construction permits.

⁷Those courses include topics such as sustainable agriculture, sustainable forestry, fire management, anti-hunting regulations, national park laws, biodiversity conservation, sustainable development, climate change and carbon

with water issues, decrying the lack of quality jobs, loss of land, and increase in cost of living that tourism has brought. For Federico, much has been lost in Guanacaste as only a few people, mostly from other parts of the world, have benefited financially from the tourism explosion. For him, aquifers are the last resources left, as local people have lost most of their land. For Federico, a good life depends on limiting water extraction.

Jürgen's sufficiency fact extends in the direction of government agencies, investment, and development; Federico's sufficiency fact entails slowing down tourism in the name of aquifer protection and the responsibility to guarantee future water. Each sense of sufficiency places the 100 l/s quantity within very different theorizations of a good life. Asserting that there is or is not sufficient water by only invoking 100 l/s without any reference to its significance would be meaningless. To matter, 100 l/s needs to be theorized in terms of its implications. Or more precisely, for Jürgen and Federico, sufficiency cannot be a fact unless it is part of a broader understanding of water and its place and uses in Guanacaste.

In the tradition of short facts, a broader understanding of sufficiency would be presumed an external interpretation of a hard factual core. The fact itself would be circumscribed to the material existence of 100 l/s. At most, in the tradition of short facts, Jürgen and Federico would be enacting a controversy around this kernel of techno-scientific truth.⁸ But in the tradition of long facts, sufficiency is not a fact unless its implications for economic opportunities and environmental health are part of its meaningfulness. Sufficiency can only be a fact if its consequences for the future are considered. Furthermore, that extension not only speaks of what will happen but explicitly conveys who has been part of a factual determination, precluding the possibility of distant, uninterested, and "objective" observation. Long facts are intrinsically understood in connection to the fact-makers and as a function of the institutional legitimacy they claim in producing truth.

5. Factual oscillations

Given that long facts shape our conditions of existence, theorizations of their extensions do not stay fixed. In Guanacaste, people are savvy about this and regularly revisit their facts in terms of their impacts, political and material. If at one moment a person embraces a particular fact, it is not uncommon for them to shift their position, extending that fact in a different direction, seemingly contradicting themselves. Federico's interventions at the AC meetings illustrate these dynamics.

At another meeting, after Jürgen stated his characteristic position, Federico stood up and in a surprise move, instead of opposing Jürgen as he usually did, seemed to align with him. Rather than calling for less water usage, Federico acknowledged that the 100 l/s quantity might allow for using more water in the present, coming close to the position Jürgen has always held. Yet Federico inflected the notion of sufficiency with a concern

sequestration, and, most recently, aquifer protection. These topics can be read as a history of the political ontology of nature as a concern of the Costa Rican state.

⁸As a preferred technique in STS, mapping scientific controversies reveals the contested nature of expertise, showing its partial nature and how it can operate as a stage where actors and forces confront each other around particular technoscientific issues (Barry 2012; Marres 2015; Nelkin 1995; Sarewitz 2004). For Whatmore (2009, 588), controversies are "events in which the knowledge claims and technologies of environmental science, and the regulatory and policy practices of government agencies that they inform, become subject to public interrogation and dispute."

for justice. He noted that he had information that other community aqueducts continued to approve water connections despite having agreed not to do so. For Federico it was unjust that this aqueduct association had to deny water-use permits to protect the aquifer when other associations were granting permits more lavishly. “This is all one aquifer, it is the same water,” he reminded us. If his community aqueduct association was the only one denying water permits, things would have to change. If more permits were to be approved, water needed to be allocated in a fairer way. Household users would have to be prioritized. For him, it was not fair for his aqueduct association to be asked to make this sacrifice if others were not willing to do the same. Arguing for using more water was uncharacteristic for Federico.

To be sure, there was some rhetorical play in Federico’s intervention. But there was something else too. In this somewhat unexpected twist, Federico turned the 100 l/s quantity into a veiled threat – a reminder that justice requires sharing the work of resisting predatory development, revealing yet another use for the sufficiency fact. A new extension with accompanying implications. Many of us doubted if Federico truly believed this. But from that day onwards, his position in the aquifer commission oscillated. Sometimes he argued that the 100 l/s quantity established the need for restraint and slowing development. On other occasions, when the aquifer commission was discussing justice and who would do the work of denying water connections, he elongated the 100 l/s fact towards development and extraction – if done justly. From the perspective of short facts, Federico’s contradictions might seem an inconsistency, a disregard for truthfulness, or a cynical maneuver. But from the perspective of long facts, it is only logical for theorizations to change as the implications of facts change. Shifting the elongations of a fact does not necessarily negate its truthfulness.

6. An abundance of factual regimes

What to make of the micropolitics of facts in collective political debate? Keeping in mind the turbulent history of sufficiency as a techno-scientific fact in Guanacaste, and the very real struggle to sustain different senses of collective life, how does sufficiency become a fact? And what do Federico’s oscillations tell us about the difference between facts as short, autonomous pieces of information – as bits of worlds – and facts as elongated entities entwining the history of their production, their interpretation, and their consequences in concrete times and places?

As social realities, facts exist in concrete historical conjunctures. They condition those worlds; they are more than abstract bits of information. Facts are past-oriented in the sense of their production and the histories through which they are established. They are also future-oriented in the sense of how they condition what is to come. In the public sphere, facts are reflections of who is authorized to establish truth and through what means – legal, scientific, religious, historical. The exercise of demarcating truth from falsehood does little to help us understand this elongated character. In the public sphere, facts are “always much more than mere unequivocal truth(s)” (Ballestero, 2019a, 20), but rather social realities that matter because of how they mold what is possible in collective life.

From within the ideology of short facts, the Jürgen-Federico affair would seem a series of tactical, maybe even cynical, rhetorical moves on the stage of public debate. In response, the impulse would be to “fact check” those public performances for accuracy and demonstrate whether they reflect vested economic interests, limited scientific literacy, or outright manipulation. But that analysis presumes facts matter because they contain a stable, concise, and self-sufficient bit of the world that exists above political struggles and independently from its implications. Put differently, in that analysis, a fact would be a piece of the world that is independent of people’s relation with it. That explanation also contributes to a type of theorization that elevates short facts and describes Latin American science and technology worlds as inherently behind their Eurocentric counterparts (Kreimer and Vessuri 2018; Mavhunga 2017; Medina et al. 2014; Monteiro 2020). That lag is exemplified in notions that science is not robust enough, that the self-evidence of a fact has been tainted by external interests, or that there is a limited public understanding of science. That lag and absence signal an operational theory of deficit is at play.

Analyses that lament the contemporary erosion of short facts also rely on this kind of operational theory of deficit. This theory finds weak scientific traditions, limited economic resources, restricted scientific literacy, or a weak rationality (as opposed to expansive emotion, for instance) as the forces behind the ongoing transformation of architectures of objectivity and truthfulness.

But if we intentionally bracket assumptions of deficit and adopt the opposite approach as an epistemological orientation, starting from an operational theory of abundance (Amimoto Ingersoll 2016; Graeter 2017), the Jürgen-Federico affair can be approached in a new light. It is no longer an example of a lack of sincerity, lack of understanding of science, or inability to deal with real (i.e. short) facts. An operational theory of abundance opens the door to track the coexistence of multiple regimes of facticity. Jürgen’s and Federico’s sufficiency fact exemplifies a factual regime where facts are publicly understood as engrained in the extensive character of life, in the legal and administrative structures that sustain it, and in the consequences it potentially unleashes. We can think of this as the regime of facts on the street, where consequence and implication are integral to how people conceive of and use their facts.

7. Conclusion

Within modern scientific discourse, and at the core of current reckonings with misinformation and conspiracy theories, is a presumption of facts as short entities. Short facts are taken for granted as concise pieces of information about the world, carrying information that can be moved across realms efficiently. These facts are inscribed within a binary register of empiricism evaluated on the basis of truth or falsity. Short facts are assessed by determining whether they have been appropriately produced and whether they have been manipulated. People may assess their consequences but take those as external and independent from the nature of the fact itself; here interpretation and consequence are external.

Long facts, on the other hand, constitute a more extensive register of empiricism. As part of their nature, these facts include histories, interpretations, and implications. Long facts are explicitly taken as contested, clearly enmeshed in social relations, and

uncontrollably expansive. Long facts condition existence. They are arrangements with material and semiotic implications, not merely knowledge turned into bits of information.

In Latin America, and probably elsewhere, long facts have existed for a long time—as particulars with pasts and futures, and as regimes of facticity. Today, people consider the length of facts a matter of public discussion as scientific information and taken-for-granted truths are dissected in digital and analog spaces. The proliferation of long facts in public discussions is also due to the multiplication of venues (committees, commissions, working groups, task forces) that emerged in the late twentieth and early twenty-first century to bring people closer to the techno-scientific knowledge that impacts their everyday life. If in a purified history of the Enlightenment short facts were solid because of the scientific knowledge that made them true, today, long facts demand attention to their consequences and how they matter in social life in order to determine how robust they are.

By examining how people maneuver with and around long facts, we see the outlines of a factual regime that has existed since colonial times. This regime interweaves truthfulness, struggles over sovereignty, and future-making. The idea of facts in this regime of facticity is not predicated solely on the legitimacy of science as an institution or on an abstract metaphysical truth. Rather, the contours of the truthfulness of a fact are elucidated through innumerable meetings, phone conversations, WhatsApp messages, blog entries, public discussions, and circulating reports where its implications are dissected. These implications remain linked to the institutions and individuals involved in fact production and to the ideas of a good life that surround them. These kinds of facts are borrowed, passed along, taken back, repeated, ignored, elongated, shortened, and more. They are entities that have always been political and openly recognized as such by everyday people.

The contrast between long and short facts highlights the rich pragmatics of facts in Costa Rica, Latin America, and elsewhere. It shows the coexistence of multiple factual regimes. That richness requires a critical approach that does more than document a lack of truth or inadequate scientific literacy in an era of disinformation, environmental decline, and populisms of different sorts.⁹ To grasp that richness, my analysis has moved from studying the production of facts, a classic gesture in STS and history of science, to consider their use as integral to their nature.

Following insights from STS, namely that facts are “durable and legitimate only within an underlying architecture of objectivity” (Kelkar 2019, 96; TallBear 2019), one could interpret our current condition as a moment when preexisting architectures of objectivity are being lost. Old standards of objectivity are eroding and new ones are taking their place. Many scholars have offered powerful insights on this condition, mostly originating from North Atlantic philosophies of empiricism and objectivity. I have offered an approach which, instead of starting from loss, begins from the assumption that people live in an abundance of factual regimes; there is always more happening than what an operational theory of deficit allows for. I have offered some preliminary historical markers to build a genealogy of Latin American long facts. Through tracing their life on the street, long facts

⁹Of particular importance here is the emergence of an “ultra-right” movement that is incorporating traditional right-wing politicians and which, despite its authoritarian inclinations, has developed its institutional footprint through electoral politics that are democratic to one degree or another (Alenda and Escoffier 2024).

help us attend to when and how facts matter, how they condition social life, and what kinds of worlds they constitute.

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References

Alenda, S., and S. Escoffier. 2024. "Más Allá del Fascismo: Una agenda de investigación sobre la nueva ultraderecha en América Latina." *Revista de Historia Social y de las Mentalidades* 28 (1): 255–290. <https://doi.org/10.35588/03e7wr10>.

- Alpízar Rodríguez, F. 2014. *Poder y Participación Política en la Gestión del Agua en Costa Rica*. San José, Costa Rica: Editorial Arlekin.
- Amimoto Ingersoll, K. 2016. *Waves of Knowing*. Durham, NC: Duke University Press. www.dukeupress.edu/waves-of-knowing.
- Angulo Angulo, M. R. n.d. *Protección del Agua Subterránea: Caso Acuífero Nimboyores y el Conflicto entre Comunidades Costeras y Desarrollos Hoteleros de Guanacaste S.A. (Hotel Conchal)*. <https://www.ips.or.cr/Publicaciones/Resumen%20conflicto%20Lorena%20-%20Conchal.pdf>.
- Ballester, A. 2012. "Transparency Short-Circuited: Laughter and Numbers in Costa Rican Water Politics." *PoLAR: Political and Legal Anthropology Review* 35 (2): 223–241. <https://doi.org/10.1111/j.1555-2934.2012.01200.x>
- Ballester, A. 2019a. *A Future History of Water*. Durham, NC: Duke University Press.
- Ballester, A. 2019b. "Touching with Light, or, How Texture Recasts the Sensing of Underground Water." *Science, Technology, & Human Values* 44 (5): 762–785. <https://doi.org/10.1177/0162243919858717>.
- Ballester, A. 2023. "Casual Planetarities: Choreographies, Resonance, and the Geologic Presence of People and Aquifers." *Environmental Humanities* 15 (3): 266–283. <https://doi.org/10.1215/22011919-10746134>.
- Barrera-Osorio, A. 2006. *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution*. Austin, TX: University of Texas Press.
- Barry, A. 2012. "Political Situations: Knowledge Controversies in Transnational Governance." *Critical Policy Studies* 6 (3): 324–336. <https://doi.org/10.1080/19460171.2012.699234>.
- Bleichmar, D., P. De Vos, K. Huffine, and K. Sheehan. 2009. *Science in the Spanish and Portuguese Empires, 1500–1800*. Stanford, CA: Stanford University Press.
- Bonilla Bonilla, L. 2020. "El conflicto social por el acceso al agua: Poder y producción de piña en Costa Rica." *Revista Espiga* 20 (40): 97–120. <https://doi.org/10.22458/re.v20i40.3280>
- Burns, K. 2005. "Notaries, Truth, and Consequences." *The American Historical Review* 110 (2): 350–379. <https://doi.org/10.1086/531318>.
- Cabañas, J., C. W. Anderson, and J. C. Ong. 2019. "Fake News and Scandal." In *The Routledge Companion to Media and Scandal, 1 ed.*, edited by H. Tumber and S. Waisbord, pp. 115–125. New York, NY: Routledge. <https://www.taylorfrancis.com/books/9781351172998/chapters/10.43249781351173001-12>.
- Callon, M., P. Lascoumes, and Y. Barthe. 2009. "Hybrid Forums." *Acting in an Uncertain World: An Essay on Technical Democracy*, 13–36.
- Cesarino, L. 2022. *O mundo do avesso: Verdade e política na era digital*. São Paulo: Ubu Editora.
- Daston, L. 2001. "Why are Facts Short?" In *A History of Facts*, edited by L. Daston, S. Müller-Wille, and H. O. Sibum, 5–13. Berlin, Germany: Max-Planck-Institut für Wissenschaftsgeschichte. <https://books.google.com/books?id=QWRnNAEACAAJ>.
- Daston, L., S. Müller-Wille, and H. O. Sibum. 2001. *A History of Facts*. Berlin: Max-Planck-Institut für Wissenschaftsgeschichte. <https://books.google.com/books?id=QWRnNAEACAAJ>.
- Graeter, S. 2017. "To Revive an Abundant Life: Catholic Science and Neoextractivist Politics in Peru's Mantaro Valley." *Cultural Anthropology* 32 (1): 117–148. <https://doi.org/10.14506/ca32.1.09>
- Hagen, S. L. T. 2019. "How 'Facts' Shaped Modern Disciplines: The Fluid Concept of Fact and the Common Origins of German Physics and Historiography." *Historical Studies in the Natural Sciences* 49 (3): 300–337. <https://doi.org/10.1525/hsns.2019.49.3.300>.
- Jepson, W. E., A. Wutich, S. M. Collins, G. O. Boateng, and S. L. Young. 2017. "Progress in Household Water Insecurity Metrics: A Cross-Disciplinary Approach." *WIREs Water* 4 (3): e1214. <https://doi.org/10.1002/wat2.1214>.
- Jones, M. L. 2006. *The Good Life in the Scientific Revolution: Descartes, Pascal, Leibniz, and the Cultivation of Virtue*. Chicago, IL: University of Chicago Press.
- Kelkar, S. 2019. "Post-truth and the Search for Objectivity: Political Polarization and the Remaking of Knowledge Production." *Engaging Science, Technology, and Society* 5:86–106. <https://doi.org/10.17351/ests2019.268>.
- Kreimer, P., and H. Vessuri. 2018. "Latin American Science, Technology, and Society: A Historical and Reflexive Approach." *Tapuya: Latin American Science, Technology and Society* 1 (1): 17–37. <https://doi.org/10.1080/25729861.2017.1368622>

- Latour, B. 1993. *We Have Never Been Modern*. Cambridge, MA: Harvard University Press.
- Latour, B. 2004. "Why Has Critique Run Out of Steam? From Matters of Fact to Matters of Concern." *Critical Inquiry* 30 (2): 225–248. <https://doi.org/10.1086/421123>
- Marres, N. 2015. "Why Map Issues? On Controversy Analysis as a Digital Method." *Science, Technology, & Human Values* 40 (5): 655–686. <https://doi.org/10.1177/0162243915574602>.
- Marres, N. 2018. "Why We Can't Have Our Facts Back." *Engaging Science, Technology, and Society* 4:423–443. <https://doi.org/10.17351/ests2018.188>.
- Mavhunga, C. 2017. *What Do Science, Technology, and Innovation Mean from Africa?* Cambridge, MA: MIT Press.
- Medina, E., I. da Costa Marques, C. Holmes, and M. Cueto. 2014. *Beyond Imported Magic: Essays on Science, Technology, and Society in Latin America*. Cambridge, MA: MIT Press.
- Monteiro, M. 2020. "Science is a War Zone: Some Comments on Brazil." *Tapuya: Latin American Science, Technology and Society* 3 (1): 4–8. <https://doi.org/10.1080/25729861.2019.1708606>.
- Mora Portuguese, J., and V. Dubois Cisneros. 2015. *Implementación del derecho humano al agua en América Latina*. Accessed July 27, 2016. <https://www.caf.com/media/2630071/implementacion-derecho-humano-agua-america-sur-caf.pdf>
- Morgan, M. S. 2011. "Travelling Facts." In *How Well Do Facts Travel?: The Dissemination of Reliable Knowledge*, edited by P. Howlett and M. S. Morgan, 3–39. New York, NY: Cambridge University Press.
- Navas, G., and N. Cuvi. 2015. "Análisis de un conflicto socioambiental por agua y turismo en Sardinal, Costa Rica." *Revista de ciencias sociales* 150:109–124.
- Nelkin, D. 1995. "Science Controversies: The Dynamics of Public Disputes in the United States." *Handbook of Science and Technology Studies* 444:456.
- Pacheco-Vega, R. 2020. "Governing Urban Water Conflict through Watershed Councils – A Public Policy Analysis Approach and Critique." *Water* 12 (7): 1849. <https://doi.org/10.3390/w12071849>.
- Poovey, M. 1998. *A History of the Modern Fact: Problems of Knowledge in the Sciences of Wealth and Society*. Chicago, IL: University of Chicago Press.
- Porter, T. M. 1992. "Quantification and the Accounting Ideal in Science." *Social Studies of Science* 22 (4): 633–651. <https://doi.org/10.1177/030631292022004004>.
- Radin, J. 2019. "Alternative Facts and States of Fear: Reality and STS in an Age of Climate Fictions." *Minerva* 57: 411–431. <https://doi.org/10.1007/s11024-019-09374-5>.
- Robbins, J. 2013. "Beyond the Suffering Subject: Toward an Anthropology of the Good." *Journal of the Royal Anthropological Institute* 19 (3): 447–462. <https://doi.org/10.1111/1467-9655.12044>.
- Sarewitz, D. 2004. "How Science Makes Environmental Controversies Worse." *Environmental Science & Policy* 7 (5): 385–403. <https://doi.org/10.1016/j.envsci.2004.06.001>.
- Shapin, S., and S. Schaffer. 1985. *Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life*. Princeton, NJ: Princeton University Press.
- Shapiro, B. J. 2000. *A Culture of Fact: England, 1550–1720*. Ithaca, NY: Cornell University Press.
- Solís Montoya, S. M., and R. P. Zúñiga Navarro. 2019. Procesos de organización y participación comunitaria en el conflicto por el agua y la sequía en la comunidad de Nosara, Guanacaste.
- TallBear, K. 2019. "Feminist, Queer, and Indigenous Thinking as an Antidote to Masculinist Objectivity and Binary Thinking in Biological Anthropology." *American Anthropologist* 121 (2): 494–496. <https://doi.org/10.1111/aman.13229>
- Valverde Hernández, F. 2016. "El legado colonial en la producción documental de Costa Rica." *Revista del Archivo Nacional* 80 (1–12): 9–41.
- Whatmore, S. J. 2009. "Mapping Knowledge Controversies: Science, Democracy and the Redistribution of Expertise." *Progress in Human Geography* 33 (5): 587–598. <https://doi.org/10.1177/0309132509339841>
- Wutich, A., and A. Brewis. 2014. "Food, Water, and Scarcity: Toward a Broader Anthropology of Resource Insecurity." *Current Anthropology* 55 (4): 444–468. <https://doi.org/10.1086/677311>.