HOW CAN WATER PROFESSIONALS MAKE A DIFFERENCE?

A QUESTION MADE MORE URGENT BY CLIMATE CHANGE

How can water professionals make a difference? A question made more urgent by climate change

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Summary

The authors examine how those working professionally with water—whether they be water practitioners, engineers, environmental scientists, geologists, policymakers, journalists, hydrogeographers, local community leaders and citizens—engage with the question of corruption in the water sector. Corruption impacts occur at local scale, such as misuse of water in a municipality, at regional scale, such as unregulated diversions in watersheds; and at global scale, such as corrupt mismanagement of marine protected areas or the diversion of funds intended to combat climate change. The subject is urgent as tensions over water availability and the climate crisis become more pressing.

The thinking behind the research, developed by the not-for-profit network CurbingCorruption,[1] is that functional performance in any sector will be improved through strengthening the corruption prevention capabilities of the professionals working in that sector. Some of the corruption issues that would otherwise seem too broad, too sensitive or too political to tackle, can be disaggregated to more manageable levels of problem-definition, prioritisation and risk. This approach has been developed and used in other sectors, such as defence, health, education, and is here being extended to water.

The authors conducted interviews with twenty people, mostly water professionals. They included engineers in water utilities in the US, Mexico and elsewhere, environmental lawyers, geographers, geologists, ocean economy investors, ecosystem scientists, natural resources managers, plus water anti-corruption practitioners and journalists.

Four themes emerged from the interviews.

1. Unexpectedly, the discomfort of interviewees in even talking about corruption. This had several explanations: the absence of professional anti-corruption training for water professionals; the subject almost never being on professional agendas, nor being a topic of conversation; and, most of all, as a questioning of where the limits are to personal and professional responsibilities. Do water professionals have a responsibility in relation to corruption, whatever its impact on water performance outcomes? Should they seek to recognise corruption, take on some responsibility for reducing it, think about preventive measures? There was an instinctive response that tackling or preventing corruption was not part of the job of a water professional.

2. The importance of the historical and political context, expressed as the concentration of political power and elites shaping water regulatory frameworks; the politicisation and rotation of mid-level roles and the deep connection between water and land tenure rights.

3. Despite the discomfort, the importance for professionals to become more attuned to corruption issues, such as by being specific about the corruption risks and the beneficial effects of responsible public sharing of water data.

4. The necessity for adaptive, resilient community building, a byproduct of which is likely to be limiting corruption.

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1   Pyman, Mark and Heywood, Paul, 2020. " The sector and reformulation approach, enabling politicians, leaders and managers to formulate practical strategies for corruption reduction", Global Integrity. Retrieved online.

A subsidiary objective was to hear from interviewees whether they could gain from using a 'typology' of water corruption issues and, if so, whether the 45 issues identified by CurbingCorruption represented a good cross section. Many constructive comments were received, as well as agreement on the need for tools to enable practitioners to prioritise corruption issues. However, we also learnt that both water practitioners and people from the (water) anti-corruption sector were unclear about what to make of the tool or how to use it.

We learnt from this research that those working professionally with water feel both uncomfortable and ill equipped to deal with corruption issues, whether by prevention, by avoidance or by raising concerns. The research indicates that this is not just an issue of training, but also one of scope and responsibility: is it part of a professional's responsibility to look at corruption risks and issues? We, the authors, feel that it is a necessary competence, as well as an institutional responsibility.

After a broader discussion linking corruption in water with the deepening risks of water scarcity and overdrawn planetary boundaries, we conclude with a call for everyone working with this vital scarce resource to properly understand and take responsibility for water corruption; whether they be water practitioners, engineers, environmental scientists, policymakers, journalists, hydrogeographers, anti-corruption activists, local community leaders and citizens.

This report is accompanied by a companion paper *Dirty Water: Illustration of Water Corruption Modalities from Three Mexican Regions*.[2]

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2   CurbingCorruption, November 2022. Available at https://curbingcorruption.com/sector/water/.

Acronyms

CIDE	*Centro de Investigación y Docencias Económicas* (Economic Research and Teaching Centre, a well known and prestigious higher education and research centre)
M&E	Monitoring and Evaluation
NGOs	Non-governmental organisations
OECD	Organisation for Economic Cooperation and Development
SDGs	Sustainable Development Goals
WIN	Water Integrity Network

Introduction

> *"Stories from around the world tell of rivers illegally diverted and dammed, of political corruption and intrigue over water rights, of ecological and economic disaster. Mismanagement of affluent areas such as the Colorado River in the USA attest that these disasters are as common in rich countries as in poor countries. The damaging impacts of corruption in the water sector occur at every scale: from the local, such as misuse of water in a municipality; to regional, such as unregulated diversions in watersheds; to the global, such as corrupt mismanagement of marine protected areas."*

This quote, from hydrogeographer and report author Laura Jean Palmer-Moloney illustrates how water presents some unique characteristics that distinguish it from other resources and that make the sector particularly vulnerable to corruption. Water is essential for life, and it is essential for nearly every economic activity. This creates tensions over the different possible uses of water (for human consumption, health, and sanitation; natural ecosystems and habitats; agriculture; energy production; and development...), and even over the way of conceptualising water, as some view it as a Human Right, and others see it as is mainly a resource with economic value, albeit a particular one that will become increasingly scarce in years to come. These tensions were evident amongst our interviewees, as the following quotes illustrate:

> *"Water is an essential service, and it is the state's responsibility to provide water to the entire population. [...] It is time for the authorities to apply themselves and for society to make demands."*

- Interviewee 14, Investigative journalist in Mexico

> *"The thing is, the right to water and sanitation is often implicit so it is not operationalised in legal terms very well, you can't usually sue somebody easily for that right. [...] Water is a resource for [the private sector] and they are trying to secure that resource depending on the context where they are operating and they may or may not resort to corrupt practices to secure those resources in a changing environment."*

- Interviewee 20, Programme Coordinator at WIN

> *"You are not entitled to water. You need it, it is essential for life but it is not a right [...], it becomes a bargainable asset to have."*

- Interviewee 9, Former banker, US State representative and development advisor in a Blue Economy business innovation centre

Whether water is treated as a right or an economic resource, its connection to key environmental, socio political and economic issues, and to broader climate change and environmental challenges cannot be overlooked. As for the water sector itself, it should be noted that, although opportunities for different sources of water exist (extraction from aquifers, rainwater collection, ocean water desalination...), water in itself is irreplaceable.

The purpose of this research was to explore the idea that one of the best ways to develop practical solutions to corruption problems is through the efforts of professionals working within their sector. THis approach—explored and used in other sectors such as health, education, defence and construction—comes from CurbingCorruption, co-founded by Mark Pyman and Professor Paul Heywood. Corruption awareness and prevention can be an integral part of professional competence, and our

long-term objective is to help to build the confidence of those managing the earth's water resources, so they feel able to do this. This is not the situation today. For most professionals, their primary objectives and expertise relate to delivering the policies, services, or products for which they are responsible, and they feel ill-equipped to evaluate corruption challenges. Providing a common language, common tools, and guidance that is entirely specific to the sector raises confidence, building capability in mitigating the corruption impact.

This is especially true of water, where small improvements in daily operations can do more for CurbingCorruption than the broader solutions of politicians. As Transparency International, the principal anti-corruption NGO worldwide, said back in 2008:

> *"In perhaps no other area does corruption so directly and profoundly affect the lives and livelihoods of billions of people as in the provision of water. Water is a natural resource, a commodity and the foundation of life on our planet."*[3]

The substance of this project was thus to explore the views of water professionals on the subject of corruption and corruption reform in water, to get a sense of how professionals in this sector viewed the role in corruption identification and reform. We report on the findings from interviews with twenty people—mostly water professionals working in the sector—about their experiences of water corruption issues and anti-corruption reforms. They include engineers in a Mexican water utility, environmental lawyers, hydrogeographers, ocean economy investors, ecosystem scientists, natural resources managers, plus anti-corruption practitioners and journalists.

A further part of the research was to explore with them a practical typology, developed earlier by CurbingCorruption to provide guidance for people working in the water sector.[4] The typology comprises a total 45 water-related corruption issues. The 45 issues, shown on the next page, are subdivided into corruption in the different processes involved in managing water:

- **Corruption in data acquisition, data sharing and M&E** (Monitoring & Evaluation) - 14 issues
- **Corruption in operations, workforce, procurement and management** - 18 issues
- **Corruption in governance, policy and engagement** - 13 issues

The intent is that, as in other sectors, water professionals can use the typology as a base for discussion and analysis, to better identify the more relevant corruption issues and use that knowledge to best evaluate how to mitigate, eliminate, or avoid their impact.

In order to better ground our understanding about the specific corruption issues in the water sector, we also undertook a parallel project on the ways that corruption is impacting water outcomes in one high-risk part of the world. We looked at three regional water systems in Mexico: the northern states of Zacatecas and Sonora, the Yucatán Peninsula and the central Estado de México. We chose Mexico partly because the water corruption problems there have been well documented, and partly because the primary author is from Mexico and knows the regions well. Relevant findings are mentioned in this paper, and the reader is referred to that companion paper by Martinez-Rossignol and Palmer-Moloney for further detail.

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3   Transparency International Global Corruption Report 2008: Corruption in the Water Sector. Retrieved online.
4   Available at CurbingCorruption.

CURBING CORRUPTION IN WATER
Typology of 45 Specific Corruption Issues

CORRUPTION IN
Water Data Acquisition, Data Sharing + M&E

1. Improper acceptance of poorly vetted data acquisition for sharing/decision-making
2. Manipulation of data to favour upstream or downstream interests
3. Deliberately inconsistent sample collection: failure to follow protocols
4. Intentional subversion of official monitoring and auditing systems
5. Use of non-random samples to falsely increase the generalizability of the results
6. Deliberate failure to standardise field-level inventory collection (i.e., in US, not using Wetlands Inventory)
7. Irregular procedure for developing and calibrating assessment protocol
8. Withholding or inhibiting water quality/water quantity changes that correlate with vegetated marsh change
9. Deliberately erroneous reporting condition of wetland and marine habitat alteration and stressors
10. Erroneous, politicised flood reporting impacting housing and industry insurance options
11. False reporting on efficacy of septic tanks and cesspools
12. Intentionally inaccurate interpretation of point-source, nonpoint-source pollution and nutrient loading
13. Overlook of illegal, unreported, unregulated activity, such as unauthorised use of water to sustain livestock
14. Falsifying nonpoint source pollution and nutrient loading data

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CORRUPTION IN
Water Operations, Workforce, Procurement + Management

15. Bribes paid to permit issuing authorities
16. Discrimination bias in licencing, permitting, and enforcement
17. Irregularities in contracting (project RFP, award, management)
18. Fraud or collusion in supply chain dynamics: point of harvest, transportation, processing, shipping, sales/marketing
19. Cronyism/nepotism in hiring
20. Irregularities in revenue collection, revenue management, revenue spending
21. Biased data used for implementing sanitation and water quality protection measures
22. Payoffs to underestimate vulnerability and required mitigation
23. Unregulated upstream disruption to channel; change in temperature, sedimentation, etc. altering conditions
24. Intentionally weak mitigation requirements to off-set water transport of sediment, nutrients, soils, and toxins
25. Withholding or inhibiting water quality/water quantity tech transfer
26. Expert bias in complaints related to water needs and effectiveness
27. Erroneous, politicised flood reporting impacting housing and industry insurance options
28. Manipulation of land-based drivers in upper reaches of the watershed resulting in discharge directly
29. Deliberately minimal enforcement of rules and regulations related to impervious surface % and stormwater runoff
30. Withholding or inhibiting water quality/quantity transfer that model flood risks associated with sea level rise
31. Unauthorised use of water for agriculture (crops and livestock) or aquaculture
32. Improperly down-playing public health risks of shellfish consumption caused by faecal bacteria contamination

CORRUPTION IN
Water Governance, Policy + Engagement

33. Interference in acquisition and allocation by politically exposed persons
34. Capture of leadership & governance by special interest group
35. Cosmetic anti-corruption programs
36. Political fragmentation designed to undercut permitting and mitigation requirements
37. Kickbacks to officials to keep resources concentrated in area(s) favouring group
38. Politics of Position: upstream actions impacting downstream with little "so what" due to little voice/representation
39. Hidden conflict of interest tied to public registry of companies and vessels and disclosure of beneficial owners
40. Top-down agenda, not well-informed by local context; some intentionally excluded while others prioritised
41. Secretive, complex, opaque rules of engagement
42. Deliberately understaffed control apparatus for wetlands habitats & hydrologic function; deliberately weakly identified "Area of Environmental Concern"
43. Fraud to obtain protected designation/status for proposed marine or wetlands (coastal or freshwater) activity
44. Challenges of tidal and offshore energy claims by hydrocarbon industry using "incumbent" access advantages
45. Economic development incentivised by artificially low insurance rates

After discussing the findings from the interviews, we broaden the discussion to look at water corruption as a core risk to national security, and water corruption in relation to climate change.

Interviewing water professionals and (water) anti-corruption experts

The central part of this research project was interviewing water practitioners. Fifteen of the interviewees—three quarters—work professionally with water, whether in industry, government or academe, mostly with worldwide experience. The other five were from civil society, four from the principal civil society organisation working in the sector—Water Integrity Network—and one from investigative journalism. For the most part, interviewees were either acquainted with one of us or had been recommended to us. Eighteen of the interviews were live, whilst the remaining two answered in writing instead. Two of the people in the interview list were talked to jointly, due to availability restrictions.

The interviews, conducted by co-author Martinez-Rossignol, were generally about an hour long, and held via Zoom in French, English or Spanish. Some questions were asked systematically, but others were tailored to the profile, professional background and area of expertise of each participant. The starting question set is reproduced in Annex 1. Below is the list of interviewees with a brief description of their occupation:

1. **Scientist**, head of a university Water Institute, former civil servant
2. **Aaron Wolf**, water resources geographer and mediator in water disputes
3. **Barbara Schhreiner**, CEO at the not-for-profit organisation Water Integrity Network
4. **Camille Babington**, urban planning graduate working with innovative entrepreneurs and the United Nations' SDGs
5. **Craig Colton**, geographer specialised in environmental History, Water Institute advisor
6. **Dominic Moscatello**, Law graduate student focusing on water-policy and infrastructure
7. **Former engineer** at World Bank and former senior advisor at Transparency International
8. **Elizabeth Perez-Chiques**, doctor in Public Administration, professor and researcher at the CIDE, Mexico, coordinator of the Iceberg Project
9. **Glenn Anderson**, development advisor for Blue Economy business innovation, former US State Representative and investment banker
10. **Manager** at major water regulator, Latin America
11. **Engineering manager** currently working on a Mexican water infrastructure project and business development
12. **Doctor** in Environmental Science and Management, Assistant professor and researcher, Latin America
13. **Joshua Murauskas**, business owner and aquatic resource scientist
14. **Kennia Velasquez**, investigative journalist with publications on corruption in Mexico
15. **Lawrence Ives**, Senior Conservation Law Enforcement Specialist, former water reserve manager and military
16. **Marcela Lopez**, lecturer in Urban Management, also Programme Coordinator at the not-for-profit organisation Water Integrity Network

17. **Professor and researcher** in Public Administration, Mexico
18. **Urban planner and business manager** in a Mexican water engineering company
19. **Pete Chirico**, geographer, US Geological Service, environmental institute manager and researcher on resource conflicts
20. **Umrbek Allakulov**, Programme Coordinator and data scientist at the not-for-profit organisation Water Integrity Network

There were three under-represented groups in our interview list, and further follow up would benefit from including them:

- **There are few women in our pool of interviewees.** Taking a gender perspective to water issues is crucial, given the disproportionate impact of water scarcity on women's lives in many low- and middle-income countries.

- **More perspectives from Indigenous people and *ejidatarios*[5]** would have helped as these are underrepresented in the academia and in global debates about climate and water change, even though they are the ones suffering the most from it and often at the frontline of the fight for land and water.

- **People who experience water corruption on a daily basis**, though they may be less knowledgeable about the water and corruption sectors as such. For example, co-author Martinez-RossignoI interrogated two fishermen met on a recent trip to Mexico. They shared the failures and suspicions of corruption in their city's water system and showed the depletion of the rivers on which their livelihood depended. In terms of being affected by water cycle changes and poor water management, she also has two examples from her own family in the country: an aunt whose house was completely flooded in Veracruz, one of the states with the worst water management systems in the country, and a cousin whose shop was completely destroyed by a hurricane in Mérida, Yucatán, and who had to rely on his own savings and family network to get it back together.

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5   A form of communal ownership of land.

Findings from the interviews

The interviews opened with the interviewee being asked how they defined corruption, whether it was something they were taught about during their studies (of engineering, public administration or urban planning), whether they talked about it either formally or informally in their workplace, and whether they thought it was their role to do something about it. The answers about what constitutes corruption varied significantly across respondents, with some interviewees defining it very narrowly, (transactional or market corruption), others taking a more macro-perspective (political corruption as a form of systemic inequality in access to political power) and others voicing the ambiguity of the concept and bringing up that distinction themselves. Regarding the question of whether they were taught about corruption risks and discussed in their workplace, the answer was universally no.

There were many common points being made in the views of the interviewees, despite them coming from a wide range of backgrounds, with political views that were sometimes diametrically opposed. These common points have been grouped into four themes:

- The discomfort of interviewees in talking about corruption
- The importance of the historical and political context
- The importance for professionals to be attuned to corruption issues
- The necessity for resilient, adaptive community building

There were also two generational perspectives to the comments, with older interviewees not politicising corruption issues and taking a long term perspective regarding climate change. Younger interviewees seemed more emotionally invested when talking about water scarcity or corruption. We elaborate on these points at the end of this section.

DISCOMFORT OF INTERVIEWEES IN TALKING ABOUT CORRUPTION

Lack of any corruption awareness or training

An observation from almost all the water professionals was the lack of any sort of anti-corruption, integrity or even transparency training for engineers, urban planners, utility managers, or anyone else working in the water sector. As such, there were low levels of awareness around corruption in the field: even in the initial responses to interview requests, a couple of people declined because they felt like it wasn't really their area, and apart from specialised researchers and people working in anti-corruption organisations (WIN, Transparency International), the interviewer had to insist a little and explain the link between water and corruption to get a positive response.

This is problematic insofar as there are people working in development projects on the ground or negotiating with municipal governments over multimillion dollar water projects without any guidance on how to identify, prevent and address corruption risks. Nonetheless, when pressed, many of those who were reluctant opened up and realised they had a lot to say about water corruption. As Joshua Murauskas, Interviewee 13, put it:

> *"The notion of folks having to keep quiet is a real thing. Some narratives or systems are too powerful to overcome (not by mistake). There is also the issue of biting the hand that feeds you."*

There was one significant opposing view from a senior staff member in a large water utility. They felt that procurement processes were perfectly monitored for corruption risks, that inter-agency discussions about transparency and anti-corruption were frequent and that *"there are many initiatives to spotlight and raise awareness of the existence of this issue. Information is constantly circulated and we are forced to take courses on the topic, [...] so the margin for corruption is limited."* With this limited cohort of 20 interviews we do not have enough evidence to know whether this is a more common view or not.

"It's not my job."

The most striking comment from water professionals related to their responsibilities, and whether addressing corruption issues and/or helping to prevent them was part of their professional functions. No one saw anti-corruption as relevant to their role, nor wanted to take ownership of the issue in their field of work. As one mediator in water conflicts said:

> *"What you're looking for is not on my radar. I have many friends in water utilities but I have never had a conversation about corruption with any of them."*

The interviewees who expressed the "water corruption is too big for me" view, did so with a sense of resignation and powerlessness, even when they themselves are in direct contact with the issue and therefore in a position where they could try to address it one way or another. Given their extensive years of experience, country of residence and socio-economic circumstances, they also tended to be the ones who are likely to be the least affected by it. By contrast, the younger interviewees were more keen on articulating the need for urgent action in complex areas—from climate change to water scarcity and corruption in various sectors—and taking part in the process, even when this meant questioning their career choices or undertaking personal risks.

Some of the former group of interviewees gave the argument that it is important that certain things remain neutral, like producing scientific data that is free from political interference and can be trusted by all parties of a dispute. Clearly, not everyone has the necessary resources or capacity to tackle corruption, nor will corruption be the only issue in question. However, there is the core issue of professional responsibility and professional ethics. We believe there is a problem when water utility employees argue that a lot of what *"has to be done is in relation to water concessions, which is not my field,"* environmental geographers serving as expert witnesses in courts say *"it is not really their mission"* to take note operators or companies illegally dumping waste in a river and trying to avoid the legal consequences, or when negotiators of water treaties claim *"it is not their role to ask who is financing a project, where the money goes or comes from or whom does it benefit... that's the role of government agencies, NGOs, the press, watchdogs, people whose job is oversight"* (even though they rarely have a seat at the negotiating table).

This lack of awareness of anti-corruption being part of a professional approach is a key finding. At some point anti-corruption training should be somehow integrated into professional qualifications when people are studying to become a hydrographer, civil engineer or other professional competence. This requirement extends well beyond basic 'ethics appreciation' lectures.

Two closely related points are the legal whistleblowing obligations according to the laws of the country in question, and responsibilities required by the professional ethics of the profession. Both points were raised by Pete Chirico of the US Geological Service (Interviewee 19):

> *"In the USA, federal government whistleblowing and whistleblower protection laws indicate that employees have a responsibility to report 'a violation of any law, rule, or regulation, gross mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety.' This would indicate that at least federal employees would have the responsibility to report things like the knowledge of 'companies illegally dumping waste in a river and trying to avoid the legal consequences.' There may be significant geographic differences in the legal authority or responsibility of some of these types of professionals to report this type of activity. US federal agencies are subject to ethics rules and have a strict procedure of ethics compliance that must be adhered to when conducting producing science, representing the US government, and in the general disposition of duties. Those ethics rules are separate from the whistleblower issues mentioned above but those are obligations that US government employees have that also may touch on some of the issues in terms of requirements to report or ways that we may interact with the public or private companies related to the water sector."*

THE IMPORTANCE OF POLITICAL AND HISTORICAL CONTEXT

Many of the interviewees stressed the importance of the political and historical context, where institutional legacy created corruption problems affecting water management that remain to this day. We explored these issues in relation to one country, Mexico. The findings are summarised here, and more detail can be found in the companion paper.

Concentration of political power and elites shaping regulatory frameworks

An illustration of this in the water sector was provided by one interviewee, a foreign water engineer working in Mexico, who was quickly advised that, if he wanted to conquer a new market, the best way was to make himself known to the governor and ensure that enough politically connected people had a (private) interest in getting the project done. He also noted that it was an open secret that politicians at the municipal and state levels served as intermediaries between the public and the private sector, which generates corruption risks and allows them to broker projects that are not always in good standing.

A related aspect of the concentration of power is the ability of elites to shape regulatory frameworks in a number of sectors. As suggested by Interviewee Marcela Lopez, Program Coordinator at WIN and lecturer in Urban Management, the reason for that is that overlapping interests between political, financial and business leaders *"allow the elites to exert a sort of social control over the working class through urban planning and water access, [which] might be more about corporatisation than corruption, but both are tied to inequalities in access to the urban space."* This power distribution is also both a cause and an effect of unaddressed conflicts of interest, moonlighting, rigged procurement processes or policy capture, so *"when there are very unequal power relations, then the more powerful entity—for example a Northern water company like Coca Cola or a national regulator—can force its way without necessarily being 'corrupt' in the financial sense of the word,"* as suggested by WIN's Executive Director, Barbara Schreiner. Indeed, the anti-corruption literature shows that in countries where there is endemic corruption, companies adjust their corruption strategies depending on their size and closeness to power centres, with smaller ones recurring to bribing while larger ones invest in lobbying activities and the social capital of their shareholders to shape laws according to their interests rather than break them.[6] While these dynamics are at play regardless of how we conceptualise them,

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6   Bennedsen, M.; Feldmann, S. ; Dreyer Lassen, D. 2011. "Lobbying and bribes: A survey-based analysis of the demand for influence and corruption." CESifo Working Paper, No. 3496, Centre for Economic Studies and ifo Institute (CESifo).

determining whether or not this lobbying is a form of corruption is a matter of deciding how broadly or narrowly we define this tricky concept.

Politicisation of the middle-level roles

An important topic that arose during the interviews was that of the politicisation and rotation of mid-level roles in water agencies, although we had some contradicting evidence. On the one hand, rotation of roles always leads to changes: *"While it is true that with the constant movement of staff in the plants, there can be changes in the work philosophy, but this does not directly impact daily operations or the execution of projects, as there are both internal and external protocols preventing the politicisation of operations."* This resembled what employees of other public water agencies said about their organisation. On the other hand, according to other interviewees, a major challenge of working with water agencies such as those in Mexico was dealing with politicised organisational cultures (more than politicised people) and frequent staff rotations following electoral cycles. As explained by engineers and urban planners, this hindered the development of projects, broke accountability chains, and impeded the sharing of information and proper training of new engineers, thereby generating incompetence and unpreparedness.

Deep connection between water tenure and land rights

Apart from giving us an insight into how water practitioners feel about corruption, the round of interviews allowed us to better grasp that access to a city's water network is deeply connected to land tenure rights. Urban planning is political everywhere and, as in much of Latin America, it reflects wealth inequalities, as well as a rapid and often uncontrolled urban expansion. Because access to running water requires a substantial capital investment (even compared to electricity or telecommunications), connecting a neighbourhood *de facto* formalises it, which pushes the residents of many informal settlements to advocate for this solution.

A Program Coordinator from WIN, explained that in addition to providing a more reliable and affordable access to water (at least in theory) and implicitly granting property rights, a connection to the network makes it easier for people to get loans and is associated with notions of citizenship and social status. In rural settings, the issue of land tenure is less discussed but perhaps even more pressing because people need water and land to attend to their household's needs but, also to grow crops so in a word, *"all the corruption than happens in land registries and land management can have an impact through water on marginalised people"* (Interviewee 20).

As expressed by different interviewees, solutions to this problem will dramatically vary depending on the context: in some places, formalisation will be possible and the best solution in the long-run. But one of the engineers we spoke to also stressed that in certain settings, it might be wiser to start by fixing the existing infrastructure before expanding the network, and find alternatives for vulnerable communities in the meantime.

THE NEED TO BE MORE ATTUNED TO THE CORRUPTION

Being specific about the corruption risks

One more thing that came out from the interviews is the need to know exactly which types of corruption are occurring and their impact. In that regard, water corruption typologies like the one put together by CurbingCorruption, lists of risk areas like the one presented by *Ethos*, and the work pub-

lished by research centres like the *Iceberg Project* are crucial. Indeed, they help water practitioners, civil servants or anyone who wants change, look at the problem the right way, as these approaches frame corruption in terms of processes or procedures.

Shedding light on those and trying to make them as transparent as possible by ensuring all relevant information is public and made available in a timely fashion, is the starting point recommended by senior advisers from several leading organisations. In the words of Interviewee 7:

> *"If we had transparency in all procurement contracts, it would be a big inspiration to other organisations to do the same, [and it would have a real impact, as governments spend a lot of money on procurements (on average 30% in OECD countries) and this should be a major area of concern. Now, where to start, is really a] judgement of value, you have to ask yourself: 'what can I reasonably expect with the resources that I have if I want to make a difference?' The answer to that will depend on the situation: the country, municipality, timing… [But] you can't solve all problems at once so you have to be selective, prioritise those that can be dealt with in a reasonable timeframe and focus on those."*

Considering processes rather than people also makes it easier to take a social network analysis when doing research, or looking at incentives, procedural rules, organisational practices and social norms. Although this might seem like a theoretical matter reserved to academia, it is, in fact, crucial because *"the first actionable step [to curb corruption is] to get a very good sense of exactly what is going on"* at different levels and in different contexts. In fact, a primary reason anti-corruption reforms fail is that the type of corruption they address are not the ones actually causing the problem. This is a critical point, though: the nuance may be lost if the water professionals are not attuned to the different types of corruption; for whom the typology can be helpful. For example, certain types of transactional or market corruption might be reduced through technical solutions, but organisational corruption requires measures that are more complex and costly in monetary and electoral terms (Interviewee 17), and changing perceptions of what is acceptable and what people expect to gain from a public position takes time. The CurbingCorruption approach is to work through those issues that have been identified as practical and addressable in practical discussions as described in detail elsewhere.[7] Other approaches include that from WIN that deals with corruption in the water and sanitation sector targeted at different stakeholders.[8]

As for environmental and water sector recommendations, Interviewee 12 named third generation transparency technologies, such as virtual maps, that permit the monitoring of water quality and quantity in real time, because those types of metrics can be understood by researchers, journalists and watchdog organisations, and used to make demands or litigate. Then, once enough data are produced, *"it is a matter of doing the right research, testing our hypothesis and making our information available"* (Interviewee 20).

Whether to frame issues as 'integrity' or 'corruption'

Interviewees were asked how corruption could be discussed more by their organisations in countries: whether they were able to bring it up with their partners on the field, either explicitly or indirectly. One such approach is not to talk about corruption but to frame the problems as *integrity weaknesses* and the solutions as *integrity building*. Using the right vocabulary is important, and several interview-

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7   Pyman, Mark and Heywood, Paul. 2020. "The sector and reformulation approach, enabling politicians, leaders and managers to formulate practical strategies for corruption reduction. Global Integrity. Retrieved online.
8   WIGO 2021, op. cit.

ees expressed the concern of reducing their organisation's chances of working with water utilities if the conversation was framed around corruption. For example, Water Integrity Network, who are the principal NGO working in water, prefer the term *integrity* to *anti-corruption*, which they considered to encompass a broader set of practices. In general, the recommendation from interviewees was to be strategic and adapt to whichever language world works better in the particular context.

The beneficial effect of public sharing of water data

When implemented under the right conditions, technological improvements can have an impact, if not directly on water corruption, on the efficiency of WaSh services. For example, as an urban planner interviewee argued, sometimes the first step is simply to improve the existing water network instead of extending it to new areas. This might not seem fair in terms of social justice but their point was that in Latin America, there is a lot of poverty but there is also a large (lower-)middle class who are connected to the water network and still have trouble accessing it. And sometimes, targeted actions like replacing 5% of the pipelines can lead to a halving of leakages (which represent 40% of water losses) and facilitate the localisation of the illegal connections through which water theft occurs. Apart from that, technical solutions have the potential of tapping into alternative sources of water. For instance, *Caminos de Agua* is a Mexican organisation collecting and sharing data on water quality from non-traditional sources, *Isla Urbana* focuses on rainwater collection technologies, and *Majik Water* is an award-winning Kenyan social enterprise of atmospheric water generators. Social or organisational innovations are also promising, like the co-production and management of the water network by the inhabitants of the Oaxacan village San Agustín Etla. There, citizens participated in the operation of the centralised network to provide water to Oaxaca City, gaining some political leverage, and challenging the modern infrastructural ideal and the city-centric model of water distribution.[9]

Personal risk

Talking to researchers and journalists made clear just how dangerous it is to study and write about corruption in some countries, something that people from elsewhere might be aware of, but don't experience on a regular basis. For instance, one interviewee investigating corruption in municipal governments explained that in Puerto Rico,

> *"… you can get fired, get retaliations or go to prison [for denouncing corruption], and there is a lot of control over personnel management. But no one has ever told [her] 'I'm scared to death' or 'this could cost me my life'. In Mexico you can get killed for speaking up, so the difference is very striking and matters a lot."*

They also said that there is no institutional protection for researchers and journalists at the CIDE, there is just a voluntary Institutional Review Board offering some protection to people participating in surveys and to researchers themselves. Therefore, what they do is *"focus a lot on trends (contacting former rather than current employees), don't give out any names (never ask for the names of people involved in corruption cases and give a code to each witness to erase their personal details), don't record interviews, randomise cities and try to complement the things that people tell them with other sources so [they] can cite something instead of pointing to an internal source."* These necessary precautions make investigations difficult and draining for researchers. Apart from that, Interviewee 14, an investigative journalist who has written about corruption networks in Guanajuato and on lobbying efforts by

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9   Petit, Paul. "Water management in Oaxaca: the co-production of the service as political resistance."

soft-drink multinationals to prevent public health reforms, mentioned that she hadn't been bothered by the industry but that she and her colleagues had been harassed by the local government. In fact, they currently have open cases against some agencies, including one for discrimination because they can't get interviews anymore; they have received threats and censorship attempts; the director of the journal has started monitoring his staff because the offices were spied on by the Guanajuato Prosecutor… Yet, she firmly states it is their duty as journalists to denounce and they have reached a point where they can't go back to remaining silent.

RESILIENT COMMUNITY BUILDING LIMITS CORRUPTION

Cross-cultural communication

Another theme that came up during interviews was resilient community-building. Aaron Wolf (Interviewee 2), who has worked as a mediator in water disputes, emphasised the importance of cross-cultural communication to solve water conflicts, as well as the need for a better integration of Indigenous voices and knowledge, deep listening, and the consideration of alternative definitions of justice in dispute resolutions and the devising of compensation schemes. These social and environmental justice principles are of particular importance in Mexico due to its high diversity of Indigenous cultures, and they apply to all types of negotiations, from a local dispute over concessions between a multinational and a neighbourhood association, to the drafting of an international water treaty. As Wolf pointed out:

> *"In the case of transboundary water conflicts between Mexico and the United States, issues of equity and fairness have been important drivers of renegotiation because some of the original treaties were quite unfair. And it was the recognition of the inequalities and power relations between the two countries [through cross-cultural dialogue] that led to a fairer and more collaborative management of transboundary waters, not an actual reduction in these inequalities."*

For such cross-cultural communication to be viable, water professionals need to have greater awareness about hydric crises, corruption and water corruption. The interviews evidenced that people working in the water sector, with degrees in urban planning, engineering or geography for example, have, for the most part, rarely (if ever) talked about corruption in formal settings, nor had trainings about how to prevent or react to it, nor felt like it was their job to act upon it. This lack of awareness is a weakness at a time when water resources are becoming increasingly scarce and thereby raise the stakes of curbing water corruption.

Adjusting reform tools to the local sociopolitical context

An essential component of resiliency is the ability to adapt. In the case of water anti-corruption measures, this means that tools have to be adjusted to the local sociopolitical context. For example, technological solutions are constantly advertised as a way of reducing corruption opportunities by automating bureaucratic procedures, reducing the discretionary power of government officials in the provision of public services, increasing monitoring, easing financial transparency, etc. However, when launching reforms, questions that need to be asked about whether people typically have access to the internet and the necessary equipment to use a specific program? Are there enough people in the country who can access, comprehend and make sense of a dataset to denounce a problem or advocate for change for its instalment to be worth it? Is this a problem of certain individuals deliberately abusing their role or does the organisational culture of the agency incentivise corruption? Is

my tool addressing the right problem? These questions matter because all too often,

> *"technical innovations may be presented as anti-corruption strategies by people who lack the intricate knowledge of such innovations, including any unintended consequences that may emerge from their application and the ability of bad actors to adapt their tactics in response."*

– Umrbek Allakulov, WIN, Interviewee 20

The role of the private sector in mitigating water corruption also came up several times, in relation to the potential of technological solutions, Corporate Social Responsibility, and better industry standards to tackle water issues. The way that the corporate sector can be encouraged and/or pushed to assist was recognised as an important topic.

A MORE PERSONAL OBSERVATION: GENERATIONAL DIFFERENCES IN OUTLOOK

As authors, we switch here from a neutral form of writing to a more personal one, because the primary interviewer (co-author and graduate student Martinez-Rossignol) repeatedly noted a generational difference in the views of the interviewees. Older interviewees were very firm in their stance to not politicise the issue, or were commenting that the consequences of climate change are still years, if not decades, away, implying that we have the time to wait until our economic systems gradually evolves into more sustainable ones. Younger interviewees and those living in Mexico seemed more emotionally invested when talking about water scarcity or corruption, as well as more open to questioning the way the world works and their own role in addressing corruption or adapting to climate change realities. The style of responses varied depending on where the person was based. Interviewees from the "Global North" and in particular from the US tended to speak in more universalist terms, while those from "developing countries" and/or those working on the field were usually more careful when making general assertions, emphasised the importance of the local context to a greater extent, and consistently framed their reform recommendations in terms of the specific region they had specialised in.[10]

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10   "Global North" and "developing countries" are in citation marks because these are contested concepts and categories that are widely used. Nonetheless, they are preferable to speaking of "developed" and "developing" countries gives the idea that countries follow a linear trajectory from war, poverty or authoritarianism towards a rich, industrialised, Western-style democracy, an evolution that rarely occurs in reality.

Findings: the water corruption typology

INTERVIEWEE OBSERVATIONS

One of our objectives was to hear from interviewees whether they could use a typology like the one developed by CurbingCorruption; and, if so, whether the 45 corruption issues that we identify in the water typology represented a good cross section of the possible issues. Some interviewees said that the typology was comprehensive, takes a usefully detailed perspective, and helps disentangle the many different types of corruption. Others commented that it reflected an interesting approach by following the water and corruption cycles simultaneously. The three categories (Corruption in data acquisition, data sharing and M&E; Corruption in operations, workforce, procurement and management; and Corruption in governance, policy and engagement) were deemed quite relevant.

There were several suggestions for improvement to the typology; such as to give corruption in procurement a more central place; to provide separate typologies for water subsectors; to pay more attention to land and water grabs, and to issues pertaining to the water services of marginalised groups such as informal settlements and rural communities. One interviewee observed that the typology is more focused on water resources management issues than on water service issues, and that some of the issues were too specific. These suggestions will be considered and/or incorporated when the typology is updated in 2023.

However, we also learnt that both water practitioners and people from the (water) anti-corruption sector did not really know what to make of the tool or how to use it. This feedback surprised us because the typology tool is expressly designed so that those in the field can use it precisely to elicit discussion about corruption issues among their peers and stakeholders; so that the relative priority, frequency and impact of each issue can be considered. One of the authors (Pyman) has used this tool with government employees and public sector staff in other sectors and in multiple countries for this purpose (see for example here,[11] in health,[12] in education[13] and in defence[14]). The responses seemed in part due to lack of understanding about the purpose of the typology, and partly to resistance about whether such an active approach was part of the role of a water professional.

Nonetheless, there was agreement among all on the need for tools to enable practitioners to prioritise corruption issues. They wanted to focus more on the intent, frequency, impact and contextual application of each type of corruption, and on ways to assess which are the processes that the reader can tackle here and now.

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[11]   Pyman, Mark. 2020. Redefining sectors: a more focussed approach to tackling corruption. In Graycar, Adam (ed) Handbook on Corruption, Ethics and Integrity in Public Administration, Edward Elgar. Retrieved online.

[12]   Pyman, Mark 2020. Evaluation of Norway's Anti-Corruption Efforts as part of its Development Policy and Assistance: The Health Sector 2020. Contribution to commissioned report. Thematic Case Study: Health 2020. Annex 5.1 of the Study by NGC for Norwegian MFA, July 2020. Retrieved online.

[13]   Pyman, Mark. 2020. Tackling Defence Corruption: History of a 'Whole Sector' Approach. A working paper. Retrieved online.

[14]   Pyman, Mark and Kaplan, Ian, 2021. Curbing corruption in school education. Retrieved online.

IDENTIFICATION OF TYPOLOGY CORRUPTION ISSUES IN MEXICAN REGIONS

The authors separately looked at the typology through the lens of 12 Mexican corruption cases in Zacatecas, Sonora and Yucatan, with the aim to illustrate which of the 45 corruption issues appeared. Annexes 2 and 3 show the typology with the issues marked up. In the first case, 17 of the 45 issues appeared to be present, in the Yucatan cases 16 of the 45 issues appeared to be present. Such an analysis is too brief to draw mainstream conclusions, but illustrates how the typology can be used post-corruption as well as in a preventive mode. For more information, see the companion paper by Martinez-Rossignol and Palmer-Moloney.[15]

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15   Martinez-Rossignol and Palmer-Moloney. "Dirty Water: Illustration of Water Corruption Modalities from Three Mexican Regions," CurbingCorruption, November 2022. Available online.

The broader picture: water corruption, security and climate change

We said at the beginning that water is connected to many areas. Therefore, the last section of this paper zooms out of the water sector *per se* (such as water distribution, sanitation, hydropower and the blue economy), to consider two broader challenges of water corruption in relation to security concerns at the regional, national and international level, and water corruption in relation to climate change.

CONFLICTS OVER WATER AND WATER IN CONFLICTS: DROUGHTS, DRUGS, AVOCADOS AND PUBLIC SAFETY

Water is one of the most critical factors for security and stability. It is an essential resource in ecosystem services & environmental security, yet its importance creates significant possibilities for insecurity—including corruption, environmental crimes, and other illegal activities. Water stress, and the failure of governments to adequately address it, can contribute to social disruption and political instability.[16]

The complex relationships between water access and conflicts is a common theme in the water literature and was recurrently encountered in the interviews. The Pacific Institute's Water Conflict database gives useful insights about the instrumentalisation of the resource by armed groups or its role as a possible casualty, weapon or trigger of strife.[17] This topic was widely covered by Interviewee 15, who worked on water infrastructure projects in Iraq and Afghanistan. He explained that "water was really an important factor for the military [in both countries]," that deficient and/or instrumentalised infrastructure meant there were markets for drinking water in Iraq, and that he had "anecdotal evidence that the water officials in the Helmand River Valley were taking bribes to control the flow of water from the river to the irrigation network." Regarding the corruption side of it, this is what he had to say:

> *"To be brutally honest, there was almost no thought given to countering corruption. And this is not to say that the Coalition were unaware of the issue or that incidences of corruption were rare or hard to find. It was everywhere and it was on a huge scale. [...] Unfortunately, there was very little desire to address this sort of thing. In 2012 there was a Counter Corruption cell established in the headquarters but I never saw a single effective action taken. [...] In Afghanistan, corruption [including water corruption] just fell into the 'all too difficult' category and was ignored."*

The weightiness of water issues in conflict settings is equally relevant for countries where the "war on drugs" has led to generalised violence. In Mexico, for example, a "hydric emergency state" was declared by the regulator in Mexico in summer 2022, because water has become a critical issue for both military forces and cartels seeking to sustain their various businesses. In the words of a mid-level commander of the infamous Sinaloa Cartel interviewed by VICE World News, *"Everything here has*

16   Palmer-Moloney. "A Loss of Ecological Security: The Demise of the Sistan Basin, " New Security Beat. April 29, 2022. Retrieved online.

17   Pacific Institute (2022) Water Conflict Chronology. Pacific Institute, Oakland, CA. Retrieved online.

an owner. Rivers, creeks, lakes... everything, especially water." As climate change exacerbates droughts and alters seasonal rain patterns, members of drug cartels warn that "the scarcer water becomes, the more [they] are willing to fight" for its control, create black markets for clean water or simply steal it.[18] Thus, in the northern Mexican state of Chihuahua, the Sinaloa Cartel is *"syphoning water from lakes, rivers, and creeks [...] to keep its own weed and poppy fields irrigated, and [...] to be the broker that supplies water to farmers, hotels, and other local businesses that have been left dry."*[19] Something similar happens in the avocado or "green gold" sector, whose lucrativeness has also attracted criminal organisations in recent years. In the world avocado capital Tancíto, Michoacán, criminal gangs "bribed agricultural officers to get the names and addresses of the most successful avocado farmers" and they now impose production quotas, lift "extorsion taxes" on avocado exports and keep farmers in check through kidnappings and fortuitous violence, which explains why in some regions of Latin America, people speak of "water and avocado cartels."[20]

Setting aside the public safety side of it and regardless of who runs the business, it is also worrying that Mexico is the world's largest exporter of beer and avocados, both of which have a very water-intensive manufacturing process and are produced in the arid northern states. As the northern city of Monterrey (5.3 million inhabitants) experienced an historic and devastating drought between February and September 2022, the debate over these trade patterns and over the role of the industry in exacerbating water crises made the headlines all summer long (see figure below on the vanishing of Nuevo Leon's Cerro Prieto reservoir between 2015 and 2022).

The Cerro Prieto reservoir in Nuevo León, Mexico has dropped to 0.5% of its capacity of 393 million cubic metres. Landsat images acquired in July 2015 and July 2022, respectively. Source: "A Reservoir Runs Dry." NASA Earth Observatory. July 2022. <u>Retrieved online.</u>

This reality also raises the questions of who is making the decisions of how much water to use in these regions, for what purposes and what are the consequences in terms of ecosystem services, water availability, social justice and public safety. This was highlighted in the interview with Marcela Lopez (Interviewee 16), who extensively studied water disputes and water access in conflict settings in Latin America before joining WIN.[21] As for the question of water usage by the private sector, Kennia Velazquez (Interviewee 14) detailed one of her investigations about the lobbying efforts of companies like Coca Cola and their ability to twist politicians' arms to get favourable regulations, be it in the public health sector or the water sector.

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18   A phenomenon known as *aguachicoleo* in Mexico.

19   Chaparro, Luis. "The Sinaloa Cartel Is Controlling Water in Drought-Stricken Mexico", *Vice*. September 20th, 2022. <u>Retrieved online.</u>

20   Schlinger, Ted and Cechin-De la Rosa, Chris (Executive producers). "Season 2, Episode 1: Avocado Wars" from the *Rotten* documentary series.

21   See for example López, Marcela. 2016. *Paisajes hídricos urbanos en disputa: agua, poder y fragmentación urbana en Medellín, Colombia*. Medellín: CONFIAR - Penca de Sábila - ISP y SINPRO. <u>Available online.</u>

CLIMATE CHANGE, WATER CHANGE AND THE URGENCY OF ACTION

The water corruption problems feed into the heart of the broader reality of climate change. Water in all its forms is indissociable from the environment and climate change is first and foremost a water-cycle change. Indeed, some of the consequences of global warming from which human societies and ecosystems suffer the most are sea-level rise, hurricanes, seasonal flooding, droughts and desertification, extreme weather events and water pollution. All of them are related to water quantity, quality and/or availability, hence the urgent need for fairer, more transparent, more efficient and less corrupt water management systems.

One of the pillars of modern Western political thought is the conceptual separation of Nature and Culture/Civilisation: this divide was visible in the way many respondents talked about water. For example, there was a tendency of detaching "water" as an economic resource or an abstract Human Right from its physical reality. As a blue economy investor noted, for those of us who have always had running water, it is easy to forget all the cycles that it had to traverse to reach our glass, and how natural ecosystems and man-made infrastructure interacted with each other and transformed the liquid's characteristics in the process.

Climates are changing and causing irreversible damage to life and livelihood—polar areas are warming, ice is melting, and permafrost is thawing, unravelling the interwoven fabric that has delicately shaped the Arctic ecosystems over millennia. Steppe grasslands that experienced temporary droughts are becoming arid deserts. The record-breaking temperatures of recent years will continue to aggravate, and millions of people have already died or seen their lives shattered by these weather and water changes. When it comes to protective infrastructure against extreme natural events, it often is costly, unequal in terms of protection (people in informal settlements and marginalised groups are typically left out) and too rigid in terms of planning to be sustainable or adjustable to changing environments. More generally, despite the wide variety of actors who participated in this project, some of whom were engineers or investors in Blue Economy innovations, there was a general agreement that technological solutions will not be enough to neither curb corruption nor solve climate change, as evidenced by the following quotes:

> *"Even if we eventually manage to take carbon out of the atmosphere, technology won't solve global challenges for all of us in the sense that it will not be sufficient to mitigate and adapt to rising global temperatures, and its myriad of consequences disproportionately affecting the world's poorest."*

- Interviewee 1, MSc in Aerospace Engineering and Technology and Policy from the MIT; recognised expert on water policy, transboundary water and the water-energy-climate nexus

> *"Resorting to scientific solutions gives the impression that the problem will be solved with technical and social innovations. Technologically, that is not the answer and socially, we would need to have a really open public debate to find acceptable solutions, and currently, we don't. Innovation will be key [in climate change mitigation] but what we need first of all is to rethink the economic model behind it. [...] When you see the targets of energy sobriety and adaptation strategies, the main thing that we notice is that we need to invest in renewable resources, but also to slow down and simply consume less."*

- Interviewee 11, Water engineer for a water engineering firm in Mexico

> *"There are some real flaws with investing in expensive infrastructure [to protect coastal areas from things like flooding, sea-level rise and hurricanes]. Infrastructure tends to give people a false sense of security, [...] there is this idea that infrastructure is impenetrable and when we start throwing money*

> *into it, the problem will be fixed, but that is not the case because there are always limitations. [...] Besides, that is where you have the chance for corrupting influences, as politicians sometimes will take this option even if there is a cheaper alternative because it allows them to channel benefits to supporters (clientelism), so people with with little political power are the ones bearing the burden of how decisions are made."*

– Interviewee 5, Environmental geographer

> *"The balance is more political than technical. [Corruption] is not, or not just, a technical problem that can be solved by improving certain devices, the use of technology or even the career system. A lot of it really depends on the political backdrop."*

– Interviewee 17, Mexican Professor and water researcher

One of the interviewees said that change takes time and people react better when presented with "happy news" and success stories, but co-author Martinez-Rossignol, like so many from Generation Z, are convinced that the world is well past that point. As some water rights activists start talking about "'Day Zero' for the date when a region will lack sufficient [drinkable or clean] water to meet its basic needs", the only thing we can do now is stop lying to ourselves about how much time we have left and take the bull by the horns.[22] It is not a matter of "bouncing back," it is a matter of reducing as much and as quickly as possible our impact on Earth systems, finding resilient practices and long-term solutions that give us enough flexibility to adapt to rapidly changing environments, and protecting marginalised communities. This requires reimagining rather than rebounding.

Left: "Water must not be a privilege" | Right: "Not silver, not gold, water is the treasure."
Source: "20 fotos de la marcha frente al ingreso or el Día Mundial del Agua." Infobae. March 22nd, 2021. Retrieved online.

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22   Pearson, Tamara. "It's Not a Drought, It's Looting: Water Rights Activists Organise in Mexico", *Truthout*. April 2022. Retrieved online.

Conclusion

We have learnt from this research that those working professionally with water feel both uncomfortable and ill-equipped to deal with corruption issues, whether by prevention, by avoidance or by raising concerns. The research has shown how this is not just an issue of training, but also one of scope and responsibility: is it part of a professional's responsibility to look at corruption risks and issues? We, the authors, feel that it is both a necessary competence and an institutional responsibility, though we do recognise that this has been a small study and that there should be broader discussion.

In the meantime, nothing is lost by taking up responsibility and taking action to mitigate corruption. Water corruption has considerable real-life consequences in holding back action on climate change. We cannot afford "this is how the system works" resignation to the "all too complicated" problems because this is not just about ensuring a green planet for future generations. It is about helping the people who are already affected by weather and water-cycle changes, and avoiding a point of no return during *our* time on Earth. Thus, in the context of the deepening risks of water scarcity and over-drawn planetary boundaries, this contribution is a call for action for us to properly understand and take responsibility for water corruption as water practitioners, engineers, geologists, environmental scientists, policymakers, journalists, hydrogeographers, anti-corruption activists, local community leaders and citizens.

Annex

LIST OF INTERVIEW QUESTIONS

Questions were very tailored to the profile of the interviewee and since the interviews were semi-structured and the discussion sometimes took unexpected turns, there were a number of topics that only came up once or twice. The list below lists the type of questions that were asked and only shows those for which there were least some responses.

General questions

- Can you detail what you were doing in your different positions?
- Can you tell me more about your field experiences? Where did you go, what did you do precisely, which types of corruption (if any) did you observe? Are there any lessons that you learned that could be transferable to the Mexican case?

Definitions, anti-corruption training and discussions about corruption

- Corruption is a tricky concept, and even within our pool of interviews, we have had people who define it in very broad terms and others in very narrow ones. Where do you stand?
- Throughout your studies and then in your different workplaces, did you ever receive training on corruption? Were you ever taught about the risks of rigged procurement processes, illicit political lobbying, whistleblowing mechanisms, how to deal with conflicts of interest, etc?
- How common are discussions of corruption in your workplace? Is it something you talk about in formal settings (conventions, compulsory seminars, meetings) and / or informally, such as over lunch with your colleagues? If so, when, where, with whom and with which terms is corruption framed?
- Some of our interviewees have pointed to the fact that sometimes, it is better to avoid the word "corruption" when working with partners (NGOs, utilities, local governments, etc) on the field so as to not antagonise them. In your experience, what are the main differences in the ways different stakeholders address or even name problems related to corruption? Are there key words or messages to which people on the field will be responsive in certain contexts but not in others?

The CurbingCorruption typology

- What do you think of this typology? Do the categories seem appropriate?
- Which types of corruption from the typology have you seen most often / do you think are the most frequent? Have you observed other types that are not in the typology?

Possible solutions and mitigation strategies

- In your experience, what are some key success factors to build community resilience, and adaptation/mitigation strategies to changing environments?
- What could be alternative solutions to provide water access to inhabitants of informal settlements? What can be done in areas where people rely on water trucks or have dirty water coming out of the tap?

- What should be the place of Indigenous knowledge and beliefs in the management and preservation of natural resources?

Climate change and corruption considerations

- When evaluating the financial aspect of a project, (how) is corruption taken into account? How do you incorporate the cost of bribes, cost of inefficiencies linked to corruption into calculations?

- What about climate change? When private companies, startups or NGOs expand their activities to a new country, how do they account for desertification, sea-level rise, extreme weather events, etc… in their planning? And how optimistic or pessimistic are their forecasts (for example, which of the different scenarios of the IPCC do they base their forecasts on?

The role of the private/corporate sector in water negotiations and debates

- What is the role that the private sector—particularly large corporations such as multinationals—play in water negotiations?

- What do power dynamics between different actors look like in negotiations?

Technological and large-scale projects

- What do you think is the role of social and technical innovation in advancing sustainable development? Do you think new technologies and engineering methods are viable solutions to some of the biggest challenges posed by global warming or do you see it more as greenwashing or an excuse to continue with business-as-usual?

- To what extent is building protective infrastructure against floods, sea-level rise, hurricanes, etc… a good adaptation strategy in terms of effectiveness, cost-efficiency and equity?

About water management and water corruption in Mexico

- From your perspective, what are some of the main problems in water management in Mexico?

- President AMLO's political discourse has always places a big emphasis on corruption. Has there been any changes (positive or negative) in the way in which his administration has addressed corruption, in the water sector or else?

- What are the main issues and differences in water planning and management in a non-conflict and a conflict or post-conflict situation? Water can act as a possible trigger, weapon or casualty in conflicts, so what is its role in drug wars like that of Mexico and Colombia?

CORRUPTION ISSUES IDENTIFIED IN ZACATECAS, SONORA CASES

CURBING CORRUPTION IN WATER
Typology Issues Identified in Mexican Corruption Cases
Zacatecas and Sonora

CORRUPTION IN
Water Data Acquisition, Data Sharing + M&E

1. Improper acceptance of poorly vetted data acquisition for sharing/decision-making
2. Manipulation of data to favour upstream or downstream interests
3. Deliberately inconsistent sample collection: failure to follow protocols
4. Intentional subversion of official monitoring and auditing systems
5. Use of non-random samples to falsely increase the generalizability of the results
6. Deliberate failure to standardise field-level inventory collection (i.e., in US, not using Wetlands Inventory)
7. Irregular procedure for developing and calibrating assessment protocol
8. Withholding or inhibiting water quality/water quantity changes that correlate with vegetated marsh change
9. Deliberately erroneous reporting condition of wetland and marine habitat alteration and stressors
10. Erroneous, politicised flood reporting impacting housing and industry insurance options
11. False reporting on efficacy of septic tanks and cesspools
12. Intentionally inaccurate interpretation of point-source, nonpoint-source pollution and nutrient loading
13. Overlook of illegal, unreported, unregulated activity, such as unauthorised use of water to sustain livestock
14. Falsifying nonpoint source pollution and nutrient loading data

CORRUPTION IN
Water Operations, Workforce, Procurement + Management

15. Bribes paid to permit issuing authorities
16. Discrimination bias in licencing, permitting, and enforcement
17. Irregularities in contracting (project RFP, award, management)
18. Fraud or collusion in supply chain dynamics: point of harvest, transportation, processing, shipping, sales/marketing
19. Cronyism/nepotism in hiring
20. Irregularities in revenue collection, revenue management, revenue spending
21. Biased data used for implementing sanitation and water quality protection measures
22. Payoffs to underestimate vulnerability and required mitigation
23. Unregulated upstream disruption to channel; change in temperature, sedimentation, etc. altering conditions
24. Intentionally weak mitigation requirements to off-set water transport of sediment, nutrients, soils, and toxins
25. Withholding or inhibiting water quality/water quantity tech transfer
26. Expert bias in complaints related to water needs and effectiveness
27. Erroneous, politicised flood reporting impacting housing and industry insurance options
28. Manipulation of land-based drivers in upper reaches of the watershed resulting in discharge directly
29. Deliberately minimal enforcement of rules and regulations related to impervious surface % and stormwater runoff
30. Withholding or inhibiting water quality/quantity transfer that model flood risks associated with sea level rise
31. Unauthorised use of water for agriculture (crops and livestock) or aquaculture
32. Improperly down-playing public health risks of shellfish consumption caused by faecal bacteria contamination

CORRUPTION IN
Water Governance, Policy + Engagement

33. Interference in acquisition and allocation by politically exposed persons
34. Capture of leadership & governance by special interest group
35. Cosmetic anti-corruption programs
36. Political fragmentation designed to undercut permitting and mitigation requirements
37. Kickbacks to officials to keep resources concentrated in area(s) favouring group
38. Politics of Position: upstream actions impacting downstream with little "so what" due to little voice/representation
39. Hidden conflict of interest tied to public registry of companies and vessels and disclosure of beneficial owners
40. Top-down agenda, not well-informed by local context; some intentionally excluded while others prioritised
41. Secretive, complex, opaque rules of engagement
42. Deliberately understaffed control apparatus for wetlands habitats & hydrologic function; deliberately weakly identified "Area of Environmental Concern"
43. Fraud to obtain protected designation/status for proposed marine or wetlands (coastal or freshwater) activity
44. Challenges of tidal and offshore energy claims by hydrocarbon industry using "incumbent" access advantages
45. Economic development incentivised by artificially low insurance rates

Visual
Teaching
Technologies

CurbingCorruption

CORRUPTION ISSUES IDENTIFIED IN 2 YUCATÁN PENINSULA CASES

CURBING CORRUPTION IN WATER
Typology Issues Identified in Mexican Corruption Cases
📍 Yucatán Peninsula

CORRUPTION IN
Water Data Acquisition, Data Sharing + M&E

1. Improper acceptance of poorly vetted data acquisition for sharing/decision-making
2. Manipulation of data to favour upstream or downstream interests
3. Deliberately inconsistent sample collection: failure to follow protocols
4. Intentional subversion of official monitoring and auditing systems
5. Use of non-random samples to falsely increase the generalizability of the results
6. Deliberate failure to standardise field-level inventory collection (i.e., in US, not using Wetlands Inventory)
7. Irregular procedure for developing and calibrating assessment protocol
8. Withholding or inhibiting water quality/water quantity changes that correlate with vegetated marsh change
9. Deliberately erroneous reporting condition of wetland and marine habitat alteration and stressors
10. Erroneous, politicised flood reporting impacting housing and industry insurance options
11. False reporting on efficacy of septic tanks and cesspools
12. Intentionally inaccurate interpretation of point-source, nonpoint-source pollution and nutrient loading
13. Overlook of illegal, unreported, unregulated activity, such as unauthorised use of water to sustain livestock
14. Falsifying nonpoint source pollution and nutrient loading data

CORRUPTION IN
Water Operations, Workforce, Procurement + Management

15. Bribes paid to permit issuing authorities
16. Discrimination bias in licencing, permitting, and enforcement
17. Irregularities in contracting (project RFP, award, management)
18. Fraud or collusion in supply chain dynamics: point of harvest, transportation, processing, shipping, sales/marketing
19. Cronyism/nepotism in hiring
20. Irregularities in revenue collection, revenue management, revenue spending
21. Biased data used for implementing sanitation and water quality protection measures
22. Payoffs to underestimate vulnerability and required mitigation
23. Unregulated upstream disruption to channel; change in temperature, sedimentation, etc. altering conditions
24. Intentionally weak mitigation requirements to off-set water transport of sediment, nutrients, soils, and toxins
25. Withholding or inhibiting water quality/water quantity tech transfer
26. Expert bias in complaints related to water needs and effectiveness
27. Erroneous, politicised flood reporting impacting housing and industry insurance options
28. Manipulation of land-based drivers in upper reaches of the watershed resulting in discharge directly
29. Deliberately minimal enforcement of rules and regulations related to impervious surface % and stormwater runoff
30. Withholding or inhibiting water quality/quantity transfer that model flood risks associated with sea level rise
31. Unauthorised use of water for agriculture (crops and livestock) or aquaculture
32. Improperly down-playing public health risks of shellfish consumption caused by faecal bacteria contamination

CORRUPTION IN
Water Governance, Policy + Engagement

33. Interference in acquisition and allocation by politically exposed persons
34. Capture of leadership & governance by special interest group
35. Cosmetic anti-corruption programs
36. Political fragmentation designed to undercut permitting and mitigation requirements
37. Kickbacks to officials to keep resources concentrated in area(s) favouring group
38. Politics of Position: upstream actions impacting downstream with little "so what" due to little voice/representation
39. Hidden conflict of interest tied to public registry of companies and vessels and disclosure of beneficial owners
40. Top-down agenda, not well-informed by local context; some intentionally excluded while others prioritised
41. Secretive, complex, opaque rules of engagement
42. Deliberately understaffed control apparatus for wetlands habitats & hydrologic function; deliberately weakly identified "Area of Environmental Concern"
43. Fraud to obtain protected designation/status for proposed marine or wetlands (coastal or freshwater) activity
44. Challenges of tidal and offshore energy claims by hydrocarbon industry using "incumbent" access advantages
45. Economic development incentivised by artificially low insurance rates

Visual Teaching Technologies

CurbingCorruption