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At Water's Edge

TRANSFORMATIVE LOCAL ACTION FOR FLOOD RESPONSE AND CLIMATE ADAPTATION

At Water's Edge
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Executive Summary

The social, economic, and environmental consequences of flooding are already immense, and their impact on vulnerable communities worldwide is becoming increasingly evident. Water and flood risk governance will shape the future adaptation and survival of cities and communities worldwide.

With urban flooding as the entry point, and climate justice as a guiding ethical principle, Columbia World Projects (CWP) led a series of gatherings, "At Water's Edge" with leading policymakers, scholars, and activists to examine possibilities for more inclusive, equitable, and effective governance of water, with a focus on the knowledge and action of historically marginalized groups.

The main objectives of the At Water's Edge (AWE) gatherings were to:

1. Exchange experiences that highlight moments when equity concerns became central to urban water governance debates, and the conflicts and strategies that entailed;

2. Advocate for more inclusion and co-production in climate planning and policy, especially with regard to urban flooding and water governance; and;

3. Identify research pathways connected to local action that integrate multiple forms of knowledge for climate adaptation in cities.

The gatherings happened between June and October 2022 and brought together academics and practitioners from Columbia University and around the globe. Participants drew upon their personal experiences to examine the practical elements of local governance concerning ongoing adaptation practices. Conversations centered on promoting equitable, inclusive, and climate-conscious planning, policy options that advance these aims, and ways for CWP and its partners to catalyze change and innovation.

Participants underscored the need for urgent and inclusive action that prioritizes those most affected by water governance decisions. The themes raised include the value of sharing tactics for creating enduring connections across water governance networks, the need to capture contexts and stories that include local voices, and the need for advancing new approaches to ownership and stewardship for bodies of water and lands adjacent to water.

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Introduction

Background. Flooding is a major phenomenon impacting cities and is a particular threat to vulnerable communities across the globe. An estimated 1.8 billion people are directly exposed to flood events, with 89% of them living in low-income countries where water infrastructure systems tend to be less developed or suffer from inadequate maintenance[1]. In light of the increasing impacts of climate change, there is an urgency for immediate action to protect lives and ecosystems and an equal urgency to shift away from siloed and exclusionary systems to inclusive networks of water governance that address historic asymmetries.

In response to this challenge, Columbia World Projects (CWP) convened a series of five interdisciplinary gatherings "At Water's Edge" (AWE) from June to October of 2022 to promote inclusive thinking and action on matters of flooding and water governance. They involved Columbia University faculty and researchers and practitioners from universities, governments, firms, and community and arts organizations from around the world. Practitioners included leaders from environmentally-focused non-government organizations (NGOs), community-based organizations (CBOs), and municipal and metropolitan governments. These meetings were organized in close collaboration with the Columbia Climate School, the Columbia Graduate School for Architecture, Planning and Preservation, the Columbia Water Center, the Center for Resilient Cities and Landscapes, and the Sabin Center for Climate Change Law.

1. Rentschler, J., Salhab, M., & Jafino, B. A. (2022). Flood exposure and poverty in 188 countries. Nature communications, 13(1), 3527.

Process. The agenda for the meetings was set collaboratively, first in broad strokes through dozens of individual conversations among practitioners and scholars, then through a large-group virtual session in June 2022 and subsequent working group meetings. The strategic priorities that emerged from these gatherings centered on:

1. **Local coalitions:** the need to identify, construct and sustain horizontal coalitions among local community groups, businesses, and policymakers to tackle spatial inequality and build long-term capacity for adaptation;

2. **Coalitions across scales:** the need to forge multisectoral connections across geographic and political scales – spanning from neighborhood advocates to municipal and national governments and global development organizations – to meet environmental challenges; and

3. **Policy frameworks:** the need to link land development mechanisms – not least housing and tenure laws – to inclusive approaches of water governance.

The series culminated in a two-day in-person workshop at Columbia University in New York on October 26 and 27, 2022 with over 30 scholars and practitioners from Brazil, Colombia, Mexico, The Netherlands, Turkey, Vietnam, and Puerto Rico, as well as the United States. Participants contributed thought pieces on their research and practice that were shared in advance. The prior knowledge participants had of each other's work allowed them to move quickly into discussion and critical debate.

Two questions guided the workshop:

1. *How can actors in government, research, and advocacy prompt lasting change towards effective and inclusive governance of urban flooding?*

2. *What sharing of strategies and problems would strengthen organizing efforts among the groups that are deeply concerned with - but frequently excluded from - the design, planning, policy, and implementation processes?*

In plenaries and in small group sessions, participants considered the equity dimensions of climate planning and policy and ways for CWP and its partners to catalyze positive change. They underscored the value of creating enduring connections across water governance networks, capturing contexts and stories that include local voices, and the importance of advancing alternative approaches to ownership and stewardship for bodies of water.

Critical Dimensions

It is difficult to capture the full richness and range of issues, debates, critical perspectives, proposed innovations, and general inspirations from the workshop, and especially its tone – which foregrounded story-telling as well as data, and passion and commitment as well as strategy and analysis. In this and the following sections we call attention to: 1) three critical dimensions for justice and equity in the context of urban flooding; and 2) three key issue areas, all interconnected, that must be addressed with regard to equity in preparedness and response to floods, principally in urban settings.

Flooding and water governance are complex and highly charged issues that inevitably raise questions of power asymmetries and vulnerabilities disproportionately affecting historically oppressed indigenous communities, communities of color, and the urban poor. In AWE's proceedings, conversations addressed ethical considerations and critically reflected on multiple dimensions of social, environmental, and climate justice in the context of urban flooding. This section shares the critical aspects of those reflections and highlights key questions and proposed paths forward through coalitions.

First, how can we simultaneously capture the complex properties of water and flooding (physical/material and symbolic/cultural) in relation to urban governance; and also imagine flooding and water governance as entry points into broader issues of how power asymmetries shape vulnerabilities for excluded populations and probe what, before, during, and after flooding events, can be done to mitigate risks and build lasting systems with fairer processes and outcomes?

AWE participants identified how multiple aspects of water governance are deeply intertwined, including the transboundary nature of water bodies, issues of infrastructure, current and future flooding (and drought) challenges, and the uneven distribution of risk. Climate change will continue exacerbating water-related problems with rising sea levels, intensified storms and storm surges, and changes in precipitation patterns, among others.

Second, how do social inequalities intersect with the highly uneven distribution of vulnerability to flooding – across social class, race and ethnicity, gender, and location within urban settings? When designing and implementing equitable responses to flooding, actors must consider past and present patterns of who benefits and who is ignored during the post-disaster rebuilding and recovery period in terms of housing, livelihoods, health, and dignity. "The non-alignment of incentives for adaptation with political entities is particularly poignant," expressed Michael Burger, Executive Director of the Sabin Center for Climate Change Law at Columbia University. "There is no alignment between the incentives of empowered actors and the needs of resilient communities."

> *"There is no alignment between the incentives of empowered actors and the needs of resilient communities."* - *Michael Burger, Columbia University.*

To resolve this tension, actors must create and implement responses that change those past patterns through a focus on equity and redress.

Third, for both research and action, how can social/economic/political/cultural planning approaches constitute either alternatives or complements to engineering and technical approaches to flooding and water governance? Across the wide range of experiences and cases discussed, narratives emerged that focused on **power asymmetries** within and across geographies (local, regional, national, global) and **coalitions** (across geographies and sectors) that are or can be mobilized to promote equity – not just in response to flooding but to reduce the power asymmetries and vulnerabilities that reproduce and deepen risk and precarity.

Why "coalitions"? This report deploys the term in a broad sense, encompassing the multiple ways that actors, networks, and institutions collaborate to support marginalized groups and vulnerable populations in preparing for, responding to, and recovering from flooding events. Coalitions can develop strategies to grow capacity and address asymmetries of people and property; create mechanisms to communicate and recognize knowledge(s) of risk; advocate for new conceptions of ownerships in land and water; and employ tactics to widen engagement and empowerment among the public and across generations.

Coalitions are bridges that may cross:

1. **Spatial scales:** from the affected communities in their locale to and across broader political and regional scales
2. **Social sectors:** community-based organizations, government agencies and politicians at various levels (municipal, regional, national, global), NGO's, and private firms
3. **Knowledge agents:** both producers and users of knowledge, as well as the mutuality and reciprocity of knowledge interactions.

Coalitions are created for a range of purposes: emergency response, public awareness, legal and policy reform, advocacy, and mutuality and reciprocity across different actors in a coalition as both an ethical principle and as an essential tool to achieve practical goals. Many were candid about the struggles within coalitions to realize equity in voice, decision-making, and access to resources. Indeed, several suggested that conflicts within coalitions were inevitable, and that making those tensions productive is essential for effective collaboration.

Key Issue Areas

The remainder of the report is organized around three key issue areas – all interlinked – of asymmetrical power and coalitional action:

- Governance
- Ownership, Access, and Rights
- Knowledge and Communication

Governance

"Who has the power to think about what needs to be done? Because water doesn't know boundaries like politics knows boundaries." - *Diane Davis, Harvard University.*

Conceptions of responsibility and territoriality are fundamental to water governance, yet they present critical challenges to managing water resources. Many participants agreed that the Global North bears the bulk of responsibility for those aspects of climate change that cause or exacerbate flooding. Indeed, while not a principal focus of our deliberations, climate finance was strongly voiced as one area that raises questions of global accountability. On a day-to-day basis, national and municipal governments provide the frameworks through which we understand and manage our water and land, including planning for flood-prone areas, therefore shaping the ability for citizens to acquire housing in floodplains. These land use decisions frequently result in concentrations of vulnerable, marginalized communities residing in floodplains. More broadly, Miguel Angel Rodriguez Urrego, Director of IMEPLAN in Guadalajara, Mexico, defined water governance as "the set of people, processes, laws and regulations, and institutions, both private and public, through which decisions are made and actions are implemented that relate to the use and management of water."

Extreme disconnections often exist between the most vulnerable populations and the shaping and implementation of policies that prepare for, respond to, and manage recovery after floods. With reference to developments in post-Katrina New Orleans, Aron Chang, Urban Designer and Educator at the Water Leaders Institute, probed the logic behind living below sea level and spending billions per year on stormwater management as a clear instance of this disconnection. "Does it make sense to rely on a $15 billion levee system that has failed previously and will fail again in the future? Meanwhile, we continue to develop low lying, below sea level, floodplain areas."

"Does it make sense to rely on a $15 billion levee system that has failed previously and will fail again in the future? Meanwhile, we continue to develop low lying, below sea level, floodplain areas." - *Aron Chang, Water Leaders Institute.*

Public institutions and policies, in other words, frequently fail to adequately represent the needs of the most-affected communities. For water governance at the municipal level, communities typically lack access to shaping agendas, consultation in planning and implementation, and resource allocation decisions in contexts where government capacity is often limited – not least due to their lack of political clout. Without local voices and interests being listened to and taken seriously, communities may be neglected, responses may be ineffective and, at worst, policies may reproduce or even deepen vulnerability and power asymmetries. Taking community perspectives seriously, suggested Upmanu Lall, Director of the Columbia Water Center at Columbia University, suggested that taking community perspectives seriously also required reconsidering the nature and function of the government agencies tasked with listening. "One of the things I've tried to do in my life is be blunt nosed with the agencies that have the responsibility," he noted. "What you find is the people who are in those agencies are, by and large, intelligent, motivated human beings. They have been put in a structure that does not allow them to behave in that way."

Groups living in flood zones are hardly passive in addressing these power asymmetries and often seek ways to partner with and/or put pressure on public authorities to foreground their needs and interests. They develop strategies and innovations in support of equitable disaster preparation, response, and recovery. These include forming coalitions between community groups, local government, NGOs and, at times, the private sector to jointly set agendas and make decisions; partnerships across municipalities and between local, regional, and national institutions; participation in social movement alliances across locales; and the use of data to support community participation in water governance decisions.

There are three primary components central to effective water governance according to Ana María González-Forero, Secretary of the Interior at the Cartagena Mayor's Office. They include "the technical capacity to perform nature-based solutions that can scale on their own" and "resources to perform studies and constructions where needed." The final component, "trust within the people to be able to communicate the time that adaptation will really take," is perhaps the most critical piece of this puzzle but, as Gonzalez-Forero underscores, if any one element is absent, "water will move from being

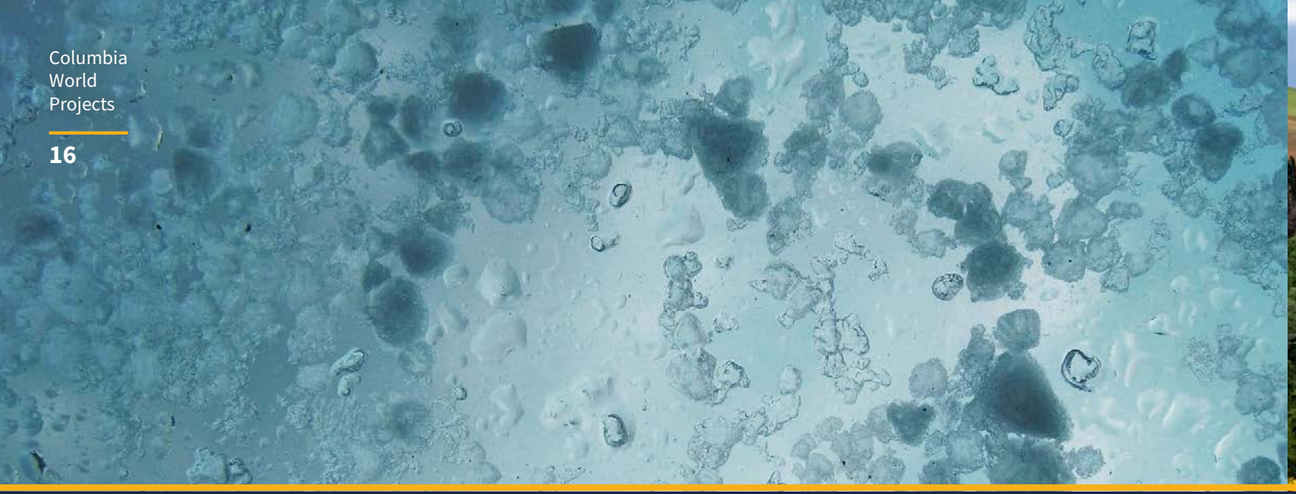
an opportunity (for energy, transportation, asset building) to a huge and unpredictable threat."

In the profiles that follow, we highlight excerpts from thought pieces written by AWE participants, and at times include comments made during the gathering, to make concrete the key issues raised and collaborative responses that address them.

Governance Profiles: Mexico and New Zealand

In the following profiles, Alicia Monraz González, who leads work in Construction Permitting at the municipality of San Pedro Tlaquepaque, Mexico and is a member of the technical working groups of the Metropolitan Area of Guadalajara's Institute for Planning and Development (IMEPLAN), tells the story of a coalitional response to a 2019 hailstorm in Jalisco, Mexico.

Then, Marama Muru-Lanning, an indigenous anthropologist from the University of Auckland, New Zealand who focuses on the governance, commodification, and privatization of water, discusses the Waikato River in New Zealand - its history and the co-governance agreement with the Māori.



Mexico, Guadalajara Hail Storm, and Intermunicipal Coalitions

Alicia Monraz González:

From a 2019 news piece:

In the early hours of July 1, 2019, in the East of the Guadalajara Metropolitan Area (ZMG), in Jalisco, Mexico, a hailstorm descended. In less than two hours, witnesses saw the hail reach unexpected heights, block streets, bury vehicles and even go into homes.[2]

This atypical climatic situation, as well as other interests for the development of the Guadalajara Metropolitan Area ('AMG'), have promoted close collaboration between the municipalities of Zapopan, San Pedro Tlaquepaque, Tlajomulco de Zúñiga, Tonalá, El Salto, Juanacatlán and Zapotlanejo. This collaboration has been led by the Jalisco State Government and organized by the Guadalajara Metropolitan Area Development Planning and Management Institute (IMEPLAN). IMEPLAN has been an important puzzle piece, operating between the municipalities as the technical lead – that prioritizes sustainable development, metropolitan planning and coordination.

The Guadalajaran municipalities connect through valuable informative digital tools such as the SIGmetro (Metropolitan Information and Management System), the municipal working groups (organized by theme), and more recently in the workshops of the "Program for Strengthening Comprehensive Risk Management and Resilience in the Metropolitan Area of Guadalajara". These workshops aimed to strengthen the capacities of leaders and parties responsible for the formulation of public policies. They specifically aimed at land use and development planning of the local governments of the metropolitan area, promoting the mainstreaming of comprehensive risk management in the design of urban and land strategies with a metropolitan vision for sustainable and resilient development.

2. Informador.mx. 'Unprecedented hailstorm affects 457 homes in ZMG. https://www.informador.mx/Granizada-inedita-afecta-457-hogares-en-ZMG-l201907010002.html

New Zealand, The Waikato River, and Co-Governance

Marama Muru-Lanning:

On the banks of the Waikato River in Ngāruawāhia, New Zealand is a Māori community called Tūrangawaewae Marae. The Waikato River is the longest river in New Zealand and is fed by a multitude of streams and rivers throughout its course. Families who lived at Tūrangawaewae knew the history of the river and had comprehensive knowledge of the great floods that drowned parts of Ngāruawāhia township in 1907 and 1910. The river is also significant to Māori oral traditions, which explain that the merging of the Waikato and Waipo rivers at Ngāruawāhia symbolizes the union of Ngāti Raukawa, Maniapoto, and Waikato peoples.

From the time of the 1865 Māori land confiscations, the Crown assumed control of, and exercised jurisdiction over, the Waikato River. Waikato Māori were excluded from decision making and were not consulted on their understanding of the Waikato River and its ecosystems. The limited Māori inclusion today is due to Waikato-Tainui iwi (tribal corporate) settling their Treaty claims against the Crown.

The claims process culminated in Waikato-Tainui iwi and the Crown signing a 2009 Deed of Settlement for the river. The deed established a new co-governance structure with equal Māori and Crown representation in a single board which is referred to as the Waikato River Authority (WRA).

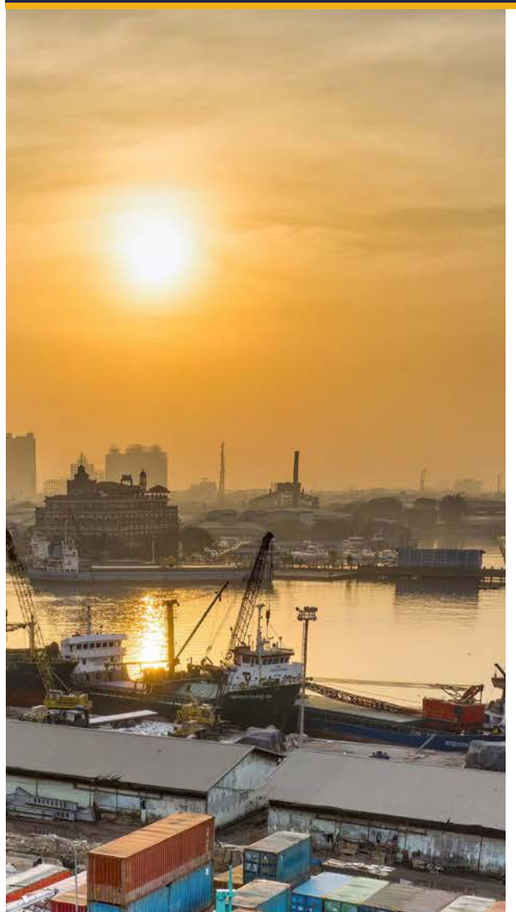
Though pragmatic, the co-governance structure is an inherently western model with appointed representatives making formal statutory decisions on behalf of the various groups. Therefore, it is a model or way of viewing the river which is foreign to most Māori and one in which they cannot easily participate. Important questions to ask are: Has the model been foisted upon a group of people within which only a few are able to participate? Is there a risk that certain individuals are able to 'capture' the process? If this is the case, it must be examined whether the full potential of the model can be realized. Why has this model been adopted in order to settle Māori interests in the Waikato River? By focusing on governance and management, the model avoids the need to determine complex political and legal issues of 'ownership.'

Governance Takeaways

- **Coalitions have histories, and the historical inequalities between groups within coalitions can constrain how once excluded groups are brought into governance processes. The agendas and structures of coalitions, particularly those between communities and governing bodies, should account for this history and be accessible, equitable, and respectful for all parties involved.**

- **Coalitions can break down silos across municipalities within a watershed or zone of impact. Third-party organizations, with representation from constituent political units, can create networks and provide technical support that improve disaster responses and recovery while creating a framework for collaboration when the next disaster strikes.**

Ownership, Access, And Rights



"There are challenges around coalition building in the Dominican Republic simply due to the fact that different challenges affect different groups disproportionately... Water sources are tied to land, and folks who don't have access to that land are also not having access to water. Because water here is managed privately, it's a bit difficult for government or policy intervention to take hold." - *Elizabeth Alvarez, Columbia University.*

Groups vulnerable to flooding tend to live in substandard housing in areas with poor infrastructure and limited public services. Their claims to land tenure can be uncertain or unrecognized. During and after flooding events, this imperils their ability to return to their homes or to claim compensation if forced to relocate. Sometimes with the support of local governments, private business interests use flooding crises as an opportunity to acquire waterfront and floodplain property for development or speculation. Not only land but ownership of and access to water itself is often privatized and decisions on its use are made without community involvement. Should this trend continue, noted Subit Chakrabarti, Director of Technology at Floodbase, "resilience will continue to build in whiter, wealthier communities, where flood recovery funds are more often channeled. Public flood mitigation adaptation decisions are inherently political," he continued, "which means increased power and access of historically marginalized groups [is necessary] to shape urban flood governance."

> *"Resilience will continue to build in whiter, wealthier communities, where flood recovery funds are more often channeled. Public flood mitigation adaptation decisions are inherently political".* - *Subit Chakrabarti, Floodbase.*

The neglect of vulnerable and affected populations, or deceptive efforts to take advantage of them, is frequently contested by these populations and those working on their behalf. Participants described examples in which community organizations, in partnership with advocacy groups, lawyers, and others, stake claims to rights in land, water, and other resources – with the goal of either returning to their homes with greater security and protection or of relocating on their own terms and with fair compensation. These include collective models of ownership of resources through land trusts and indigenous frameworks for stewardship, among others; mobilization to contest gentrification and land speculation and to promote greater regulation of for-profit actors and community control; and even insurgent acts when rights claims are ignored.

For better or worse, the legal regimes delineating water management are inextricably linked to the political systems and processes specific to different places. "When we had floods in the Netherlands, we made a law," Lisa Hartog, Senior Advisor for Climate Adaptation and International Water Affairs for the Netherlands, explained. "Because of that law, we now have a program that defends our coastlines. But, this is a democratic country. If you don't have a democratic country you may have a law that is antithetical to the whole system."

Ownership, Access, and Rights Profiles: Indonesia and Puerto Rico

In the following profiles, Kian Goh, Associate Professor of Urban Planning at the University of California, Los Angeles, first provides important contextual understanding of the sociopolitical conflicts pertaining to kampung (urban village) settlements in Jakarta, Indonesia. Then, Raúl Santiago-Bartolomei, Assistant Professor at the Graduate School of Planning of the University of Puerto Rico-Río Piedras, and Lyvia N. Rodríguez Del Valle, an urban and regional planner who has worked for 27 years in issues related to the right to the city, disaster risk management and collective land tenure, together paint a picture of Puerto Rico's informal housing in the context of both post-disaster recovery and as an instance of a regularly flooded community that organized and advocated for their land rights.

Indonesia, Urban Flooding, and Kampung Politics

Kian Goh:

The Jarkarta, Indonesia region floods chronically. This is often attributed to inadequate infrastructure, such as clogged canals and rivers, and the actions of the urban poor in informal kampung settlements along the coastline and waterways, who city officials accuse of degrading the waterways. This has led to plans to evict and demolish the settlements. Kampung residents, among the poorest residents facing the worst flooding threats, have mobilized against these plans. They cite histories of social and spatial marginalization – across racist colonial years, post-independence nation building, and more recent liberalized urban development. They have proposed alternative, community-led proposals for rehousing in place, with limited success.

But flooding in Jakarta is linked to larger and more abstract processes, both climate-related and non-climate-related. These include long-term patterns of unjust urban development – where urban growth and uneven infrastructure provision contributed to increased runoff from decreased permeability and ground subsidence from the overpumping of groundwater. They also include the broader hydrological system, where the canals and catchments in the city drain a system of thirteen rivers and associated watersheds that extend far beyond the city proper. That is, the injustices confronting kampung residents, while experienced in very immediate ways, are baked into the broader historical and present sociopolitics of the city, and the ecological, biophysical, and infrastructural patterns of the urban region, now compounded by global climate change.

The pressures against Jakarta's kampungs are not only from plans promoted by city leaders and political elites. They are also sustained through new global networks of environmental governance. In Jakarta, the extensive presence of transnational engineering, hydrology, design firms, and development agencies, often of Dutch origin, is quickly evident. Climate change, urban development pressures, and networks of expertise drive these globalizing efforts, but colonial histories, current geopolitical power dynamics, and specific events condition how they land on the ground in different sites.

Those of us concerned with water and flooding, especially with regards to issues of justice, need, of course, to look at the particular histories of people and places, and how specific harms are experienced. But we also need to look, first, to how vulnerabilities and capacities for action might be linked across larger spatial scales, such as the urban regional watershed with its attendant biophysical and sociopolitical conditions, and, second, to the broader processes and networks through which economic and environmental systems are responded to and flows of influence and capital are enforced. Seen in this way, the 'water's edge' extends far into the city, beyond the floods per se, but also in time, how vulnerability is produced and power is constituted in the changing urban landscape.

> *Seen in this way, the 'water's edge' extends far into the city, beyond the floods per se, but also in time, how vulnerability is produced and power is constituted in the changing urban landscape.* - *Kian Goh, University of California.*

Puerto Rico, Hurricane Maria, and Informal Housing

Raúl Santiago-Bartolomei:

Two instances of flooding in Puerto Rico during Hurricane Maria demonstrate the consequences of housing ownership, or lack thereof, in post-disaster recovery. For Levittown, a suburban neighborhood developed by a U.S. company on cheap land within a floodplain, the initial flooding was dwarfed by the impact of the nearby Rio La Plata reservoir dam being opened to prevent it from capsizing. The dam gate alarm system failed, and the downstream effect in Levittown was devastating, with some residents reportedly drowning at their homes. A similar situation occurred in Canóvanas where the Rio Grande de Loiza reservoir dam gates were opened to avoid capsizing, sending vast amounts of water into the Villa Hugo and San Isidro communities located in nearby floodplains. The difference, however, was that the settlements in Canovanas were informal; the residents lived in self-built homes and typically lacked land titles.

Informal settlements are a common occurrence in Puerto Rico due to rural-to-urban migration, rural divestment, or resettlement due to prior disasters. In post-Hurricane Maria recovery, Levittown was offered individual assistance by FEMA to rebuild and repair homes. In addition, the US Army Corps of Engineers (USACE) received funding to extend the Rio La Plata channel to contribute to future flood control. The residents from the informal settlements in Canovanas, on the other hand, were generally denied any assistance for their damaged or destroyed homes since they lacked legal titles or because they were not U.S. citizens. A year after the disaster, funding for long-term reconstruction was again denied to residents of informal settlements, and they were instead encouraged to apply for relocation assistance, which could take years.

Lyvia N. Rodríguez Del Valle:

Some communities located in San Juan along the Caño Martín Peña (Martín Peña Channel) have organized and collaborated with planners to create a new governance framework. These communities experience flooding with every significant rainfall, and the flood waters have included untreated sewage from eight informal communities and other areas of the city. After a two-year highly participatory planning process, some of the remaining settlements adopted a new bottom-up framework that includes a comprehensive development and land use plan and legislation with the policies, instruments, and governance structure needed for implementation. The governance structure includes a coalition of grassroots organizations with the role in ensuring meaningful participation and accountability; a public corporation governed by community leaders, municipal and Commonwealth government representatives, and external private citizens, and tasked with implementing the plan; and a community land trust designed to regularize tenure through collective land ownership and individual surface rights, and to avoid displacement resulting from real estate interests associated to the plan implementation.

Through the community land trust, they now collectively own the land and they individually own surface rights that they can pass down to their children. The community land trust both addresses the lack of land tenure and becomes a powerful instrument to avoid displacement. Thanks to their participation in the planning process, community members decide where they can be relocated and how those relocations are going to operate. There have been over 700 relocations to date, and all of them have been carried out through participatory processes where the families can choose to move within the community land trust if they wish to.

Though the framework itself was generated over an intensive two-year process, the groundwork necessary to reach that point was laid through sustained efforts over nearly two decades. This success has thus far led to the just relocation of hundreds and the construction of some key infrastructure projects, and the Caño ecosystem restoration piece of the project is fully funded. The key to dealing with many of these issues has been to dedicate resources in support of community organizing, popular education, meaningful participation, short-term wins with palpable impact in the quality of life. As the community has a sense of ownership over the project, they are at the heart of political action and mobilization.

Ownership, Access and Rights Takeaways

- **Informal, urban communities are highly vulnerable to both flooding and to eviction post-disaster in ways rooted in complex histories, regional watershed practices, and larger sociopolitical, economic, and environmental dynamics that include the impact of global forces and actors. In the face of these power asymmetries, communities and their allies propose and, at times, succeed in remaining in their homes under more secure conditions.**

- **Post-disaster recovery systems need to incorporate mechanisms for assisting populations that currently lack land titles, housing deeds or citizenship rights in order to counterbalance development interests in land speculation and gentrification.**

- **The establishment of land trusts, in which members of a community collectively own their land, can be a powerful mechanism for dealing with floods and their aftermath. This is especially the case when communities, with the assistance of a third-party actor that brings them together with public and private sector actors, also have ownership of the process that designs and manages the trusts. Building such coalitions takes time.**

Knowledge & Communication

"When we talk to scientists and engineers, they are a bit condescending in their description of communities. Communities understand the risks they face. The real question is what is the risk of having to leave this place and breaking relational bonds that currently exist?." *- Raúl Santiago-Bartolomei, University of Puerto Rico-Río Piedras.*

Asymmetries regarding knowledge and communication occur in two ways. First, vulnerable communities frequently lack access to scientific, social and technical knowledge that can be used to mitigate flood risk and inform political engagement and mobilization strategies. "Real political change," stressed Aron Chang, "comes from creating a lot of different entry points and giving people a chance to wrestle with images and experiences themselves so that they are then equipped to engage in the questions we all need to be engaged in." This, others suggested, is possible through the prioritization of access to knowledge, data, and education more broadly,and efforts to raise awareness about risks and the underlying structural inequalities that perpetuate them.

Second, and receiving even more focus, the knowledge and experience of these same communities are often ignored or not taken seriously in planning and implementation processes, thereby reducing their overall effectiveness. This contextual (and often indigenous) knowledge – the nuances of local environments and of the ways in which affected populations understand their relationship to water and each other in social, cultural and spiritual terms – are vital to effective and equitable responses. When discounted, communication between communities, planners and external actors breaks down and the forging of mutual trust, respect and responsibility is elusive. Yaprak Sarıışıkm, Education Laboratory Coordinator at Eğitim Reformu Girişimi (ERG), argued that we must migrate away from the "human-centric way of thinking about the world," which is oriented around concepts like "ownership" and frequently informs planning approaches. Central to this embrace of alternative forms of knowledge, she insisted, is the long-term project of forging a different "life- and planet-centric" language to describe shared environments.

Participants provided examples in which coalitions within communities (e.g. across generations) and between communities and advocacy groups, educational and cultural institutions, and planners and local government agencies allowed communities to access new information while having their own experiential knowledge incorporated into response and recovery goals and activities. These included bringing local knowledge into governance practices, jointly designed studies and reports that shape policy, transparency of relevant data, consciousness-raising regarding power asymmetries and exploitation, intergenerational knowledge sharing, and curriculum development in schools. The Living Breakwaters Project, a nature-based solution for protection across the Staten Island coastline in New York City, is one instance of the latter. Kate Orff, Professor at Columbia GSAPP and Director of the Urban Design Program, detailed the project's

education-based, which involves co-developing and widely distributing science curricula that advance aspects of the project and complement the unique focus of each partner school. The New York Harbor School on Governors Island, for instance, has integrated its hands-on maritime programming with the Living Breakwaters reef restoration efforts to create a unique learning opportunity for middle school students.

Despite the frequent discounting of alternative knowledge sources, things can improve. Referring to New York City water governance planning in the aftermath of Hurricane Sandy, Paul Gallay, Director of the Resilient Coastal Communities Project at the Columbia Climate School, observed, “While frontline communities have historically been sidelined during top-down flood protection planning processes, new options for horizontal planning coalitions are being developed and government planners are promising to treat community-based knowledge and expertise as no less essential than the knowledge and expertise possessed by planners themselves.” Preserving and accelerating this trend is key.

Knowledge and Communication Profile: New Orleans

In the following profile, Aron Chang, an urban designer and educator who works on community-based planning and design models for water infrastructure, resilience, and climate adaptation, reflects on his work at the Water Leaders Institute, which provides resources and training to New Orleans residents in order to deepen understandings of water and water infrastructure, and lead community-driven processes that address safety, access, equity, ecology, health, and culture.

New Orleans, Low-Lying Neighborhoods, and Resident Inclusion

Aron Chang:

“How better can we communicate information, and how do we teach that?...One of the organizations I’m a part of is called the Water Leaders Institute. We’re based in New Orleans and what we try to do is create a shared base of knowledge and lift up community voices, community leaders, creating spaces in which there’s a possibility of building shared knowledge with experts, designers, planners, government officials. And then developing tools and methodologies through which those community leaders have a say in the infrastructure that governs and shapes their daily lives.

“The groups I’ve been facilitating have started with story circles, that’s a big part of what we do, making sure to lift up each person’s experiences. We also do a lot of things like going on field trips. There’s nothing to me more important than the direct experience of looking at a levy together with an engineer, of taking a bus and following the path of water through a city that sits, in large part, below sea level, and to start to understand some of these counterintuitive systems of how water flows, how it’s lifted up by pumps and then dropped and lifted up again, just to get it out of the bowl we have created over time. So there’s a lot of that, experiencing things out in the field, and then we also have workshops where participants have a chance to take the topics that they think will be most meaningful to them.

“One of these workshops in our pilot cohort - we pay community leaders stipends to take part in these cohorts where they spend 15 hours engaging in these topics we’re talking about - one of these workshops was about historical research and mapping. There was a participant who grew up in one of the low-lying neighborhoods in Gentilly, which is, on average, 5-6 ft below sea level. She had shared throughout the previous workshops and field trips some of the flooding issues she’d been facing and showed us pictures. I’ll never forget - we were sitting around and everyone was holding different historical maps of New Orleans, and she pointed at one of the maps from the 19th century and said, ‘I didn’t know until today that Gentilly used to be a swamp. It makes so much sense to me now why we’re facing the water issues that we’re facing in Gentilly.’ And then she said, ‘I wonder if we should be living there anymore.’ That, to me, is so significant because of the post-Katrina dialogue, the failure of planning processes to enact any real, meaningful shifts in land use policy.”

Knowledge & Communication Takeaways

- **Creating opportunities for community members in water-affected areas to share information can inform policy, infrastructure decisions, and disaster preparedness.**
- **Effective communication and experiential learning with community members can fuel grassroots efforts to change land use policy and relocate communities.**
- **Social media, sharing information, critique and humor, can be an effective tool for contesting gentrification and displacement.**
- **In the long-term, reforms to our education system can help future generations to think differently about our relationship with nature, providing a new language and modes of understanding. Indigenous worldviews can help to provide these new foundations.**

Conclusion

While participants shared the same goals of making water governance more equitable and effective and of empowering communities to shape policy and implementation, how to do so was a matter of lively debate. On the side of public institutions, colleagues debated where current institutional frameworks could be reformed, or whether entirely new ones should be created. For communities, the commitment to ensuring their involvement in water governance raised important questions about the ways in which we use "community." Early in the conversation, Shana Griffin, Founder of PUNCTUATE, remarked, "It's not always clear, when we say "community", what we are referring to. There are racialized communities, communities of interests, regional communities, and the like. The type of community you are referring to has implications for the sort of demands made of that community, the ways in which they are accountable."

Potential paths forward were the principal area of focus, especially the need to build coalitions across spatial scales, social sectors, and knowledge agents in order to address power asymmetries and reduce vulnerabilities. The idea behind coalitions is to create spaces and opportunities to develop the tools necessary for achieving practical goals and addressing the structural sources of inequality and vulnerability in water governance. "It is water that can drive us apart, cripple our lives, destroy our environments and our economies and strengthen the impacts and origins of climate change," underscored Henk Ovink, Special Envoy for International Water Affairs for the Netherlands, "But it is also water that enables us to come together and do better, catalyzes the changes we need and is the true inspiration for sustainable development, lasting partnerships and transformative climate action." Creating platforms and networks that provide opportunities for learning across geographies, examples and experiences is essential to building collaborations for more equitable and sustainable water governance.

> *"But it is also water that enables us to come together and do better, catalyzes the changes we need and is the true inspiration for sustainable development, lasting partnerships and transformative climate action."*
> *- Henk Ovink, Kingdom of the Netherlands.*

Transforming water governance requires responding to the urgent needs of those that have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality, and planning for long-term adaptation. Thus, a range of time-scales must be kept in mind:

- **Immediate issues**, such as those related to processes of emergency preparedness and response, health care, affordable housing, and managed relocation.
- **Near future challenges**, including policies that allow for more comprehensive land rights that prevent displacement, appropriate water infrastructure that reduces flooding, and meaningful participation and accountability in decision-making.
- **Long-term actions** focused on reducing power asymmetries in decision-making and resource access through policy work, community empowerment initiatives, and education.

Beyond concrete ideas for action, participants underscored the need to inspire empathy, make intergenerational connections, and orient new models for flooding adaptation and water governance around the needs and rights of the natural world and the people who inhabit it. We should, signaled Kate Orff, engage in climate action with our "head, heart, and hands." In other words, we must simultaneously embrace the educative, emotional, and practical dimensions of this work. Flavia Nevez, picked up on this point, suggesting that "the activity angle, the 'hands,' is the hardest thing to arrive at. As people who are not close to frontline communities, we have a lot of head at the expense of the hands. In frontline communities, there is this idealization of Ivy League universities. They think we know everything. Here, we idealize those communities and think organizing can solve everything. We need to understand how to integrate this body."
The need to "integrate the body" was seen as critical to determining the right course of action for, and success of, coalitions, many of which are composed of actors with very different degrees of resources and influence. AWE brought together people from across these different sectors and dramatically diverse geographies, forms of expertise, and types of knowledge.
Yet, all were infused with and inspired by the "head, heart, hands" sensibility. In a small but meaningful way, AWE constituted a microcosm of the kinds of coalitions needed to address urban flooding and water governance that foregrounds equity, justice, and the lives and livelihoods of all urban dwellers.

Annex: List of At Water's Edge Conference Participants

- **Elizabeth Milagros Álvarez**, *PhD Student in Urban Planning, Columbia University*
- **Bernadette Baird-Zars**, *Postdoctoral Research Scholar, Columbia World Projects*
- **Michael Burger**, *Executive Director of the Sabin Center for Climate Change Law, Columbia University*
- **Subit Chakrabarti**, *Director of Technology, Floodbase*
- **Aron Chang**, *Urban Designer and Educator, Water Leaders Institute*
- **Diane Davis**, *Charles Dyer Norton Professor of Regional Planning and Urbanism, Harvard University*
- **Paul Gallay**, *Director of the Resilient Coastal Communities Project, Columbia Climate School*
- **Kian Goh**, *Associate Professor of Urban Planning, UCLA*
- **Ana María González-Forero**, *Secretary of the Interior, Cartagena Mayor's Office*
- **Shana Griffin**, *Founder, PUNCTUATE*
- **Lisa Hartog**, *Senior Advisor, Climate Adaptation and International Water Affairs, Ministry of Infrastructure and Water Management, Kingdom of the Netherlands*
- **Ron Kassimir**, *Senior Advisor, Columbia World Projects*
- **Ira Katznelson**, *Ruggles Professor of Political Science and History, Deputy Director of Columbia World Projects*
- **Upmanu Lall**, *Director, Columbia Water Center; Alan and Carol Silberstein Professor of Engineering, Columbia University*
- **Madeeha Yasin Merchant**, *Research Associate, Spatial Information Design Lab, Columbia University*
- **Alicia Monraz González**, *Senior Specialist, Building Control Directorate (Guadalajara)*
- **Marama Muru-Lanning**, *Associate Professor and Director of the James Henare Māori Research Centre, University of Auckland*
- **Flávia Neves Maia**, *President and Executive Director, Filha do Sol*
- **Kate Orff**, *Professor and Director of the Urban Design Program, Columbia University*
- **Henk Ovink**, *Special Envoy for International Water Affairs, Kingdom of the Netherlands*
- **Thaddeus Pawlowski**, *Managing Director, Center for Resilient Cities and Landscapes; Research Scholar and Adjunct Associate Professor of Urban Planning, Columbia University*
- **Lyvia Rodríguez Del Valle**, *Co-Founder, El Enjambre (Puerto Rico)*
- **Miguel Ángel Rodriguez Urrego**, *Director of Metropolitan Planning,Instituto Metropolitano de Planeación del Área Metropolitana de Guadalajara (IMEPLAN)*
- **Raúl Santiago-Bartolomei**, *Assistant Professor, University of Puerto Rico, Río Piedras; Research Fellow, Center for a New Economy (CNE)*
- **Yaprak Sarıışık**, *Education Laboratory Coordinator, Eğitim Reformu Girişimi (ERG)*
- **Hugo Sarmiento**, *Assistant Professor in Urban Planning, Columbia University*
- **Jasmin Schous,** *Senior Advisor, International Water Affairs and Climate Adaptation, Ministry of Infrastructure and Water Management, Kingdom of the Netherlands*
- **Peter Twyman**, *Deputy Director for Projects, Columbia World Projects*

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