MONSOON [+ other] WATERS

EDITED BY LINDSAY BREMNER

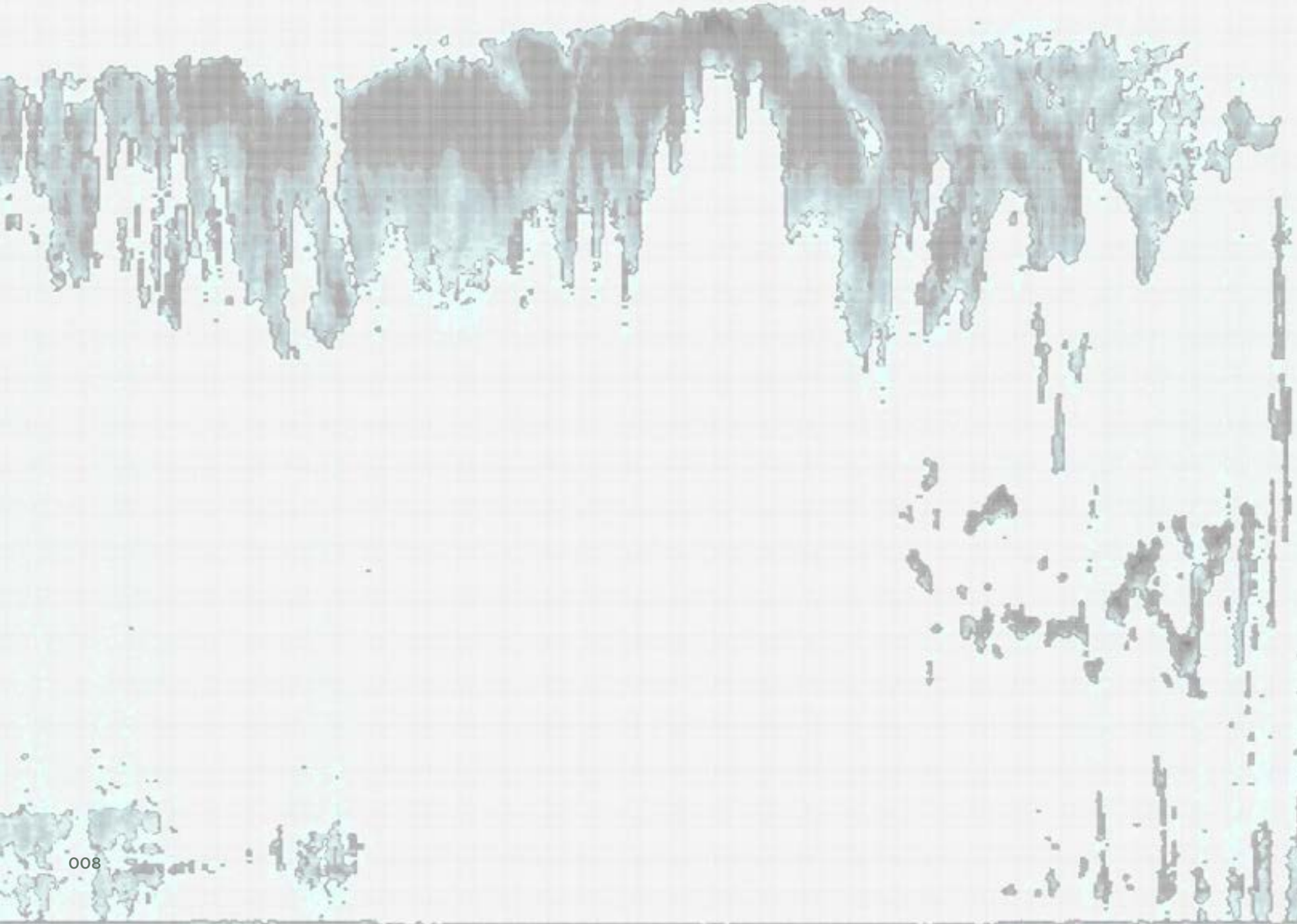
PREFACE

Monsoon [+ other] Waters is the second of three publications by Monsoon Assemblages, a research project funded by the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (Grant Agreement No. 697873). It arises from a symposium held at the University of Westminster, 12-13 April 2018. It contributes to Monsoon Assemblages' agenda to foster interdisciplinary conversations between the environmental humanities (anthropology, environmental studies, political ecology, cultural geography and philosophy), the natural sciences (meteorology, climatology and climate science) and spatial design (architecture, landscape architecture, planning and urban design) and to further understandings of the impacts of changing monsoon climates and rapid urbanisation in South Asian cities and beyond.

MONSOON [+ other] WATERS

CONTENTS

P008-009 Section through the sky over India, 23 November 2017. Tom Benson, 2018.
Tools: Rhino, Grasshopper. Data source: NASA Calipso.



INTRODUCTION

Lindsay Bremner is an architect and scholar who began her academic career in Johannesburg South Africa, where she published, lectured and exhibited widely on the transformation of Johannesubrg after apartheid. She was head of architecture departments at the University of the Witwatersrand in Johannesuburg and at Temple University in Philadelphia before taking up her current post as Professor of Architecture at the University of Westminster. Her work positions architectural research within wider geospatial and socio-material systems. This has included 'Folded Ocean,' a project that investigated the transformation of the Indian Ocean world and 'Geoarchitecture,' an exploration into intersections beween architecture, geology and politics. She is currently the PI of Monsoon Assemblages, European Research Council Grant no. 679873.

Monsoon [+ other] Waters is the second of three publications arising out of symposia convened by Monsoon Assemblages (MONASS) at the University of Westminster between 2017 and 2019. The first, *Monsoon [+ other] Airs* was published in 2017 (Bremner and Trower, 2017), this edition in 2019 and *Monsoon [+ other] Grounds* will follow in 2020. The symposia and publications are part of MONASS' agenda to foster interdisciplinary conversations between the environmental humanities (anthropology, environmental studies, political ecology, cultural geography and philosophy), the natural sciences (meteorology, climatology and climate science) and spatial design (architecture, landscape architecture, planning, urban design). They bring together researchers, designers and practitioners from diverse traditions, who use different tools and methods and refer to different literatures to stage what Amelia Barakin (2012: 01), in her discussion of the work of artist Pierre Huyghe calls 'moments of elegant irresolution.' As the monsoon does not fit the frames in which it is made to appear, the aim of these events is to cut across partitions and geographies, open up hermetic places and systems of thought, generate friction and debate and experiment with new ways of thinking, drawing, living and designing with the monsoon.

We live in a world where political geography and spatial planning are based on the separation of land, sea and air and the knowledge systems that produce them. Land is understood as solid, stable, divisible and the basis of human habitation; the sea is understood as liquid, mobile, indivisible, and hostile to human settlement; air is understood as gaseous, mobile, invisible and indispensable to human life. The monsoon cuts across these divisions. It inundates lived environments every year, connecting sky with land with sea. It is a spatial practice that reorganises air, water, land, settlements, cities, buildings and bodies through heat, wind, rain, inundation, flow and flood. It unites science with politics and policy with affect. Today climate change is disrupting its cycles. Explosive economic growth and rapid urbanisation are increasing the uncanniness of its behaviour. The frequency and severity of its impacts on human and non-human life is accelerating. In contrast with those who

propose 'climate-proofing' as response to these situations, we propose to explore the monsoon as a template for thinking with and to reorientate the environmental humanities and spatial design around its rhythms and cycles.

Monsoon [+ other] Waters took place at the University of Westminster on 12-13 April 2018. The first keynote address was given by landscape architects Anuradha Mathur and Dilip da Cunha. They posed the question of whether India is a 'landscape of rivers' or an 'ocean of rain,' suggesting that the two are very different grounds for habitation and design. A river landscape is a surface drained of water in flows between two lines to make land the undisputed staging ground of settlement. An ocean of rain on the other hand, is a ubiquitous wetness that does not flow as water does, but rather soaks, spreads, blows, seeps, osmotes and transpires in nonlinear ways. They asked whether, at a time when the separation of land and water is threatened by climate change, rising seas and increasing incidents of flood, India (and the world at large) is better served by being thought of as an ocean of rain rather than a landscape of rivers, and what this might mean for spatial design practice. Environmental anthropologist Kirsten Blinkenberg Hastrup's keynote address the following day spoke to similar questions through the idea of 'water literacy' i.e. ways of understanding and acting upon water, practically and academically, as a way of facing the challenges of living with the 'troubled waters' of climate change. Using an ethnographic case from the High Arctic, she explored how the unruliness of water, wetness and seasonality had resulted in social upheaval and the need for new spatial practices.

Other contributors to Monsoon [+ other] Waters responded to provocations put out in the call for abstracts for the symposium. The first, following Mathur and da Cunha (2017) dealt with wetness in the air, on the earth, under the earth, as an ontological condition (Peters and Steinberg, 2015) and the sensory, environmental, political and urban consequences that follow from this. Essays that explore this theme in this publication, albeit from very difference perspectives, are those by Ifor Duncan, Megnaa Mehtta, Pedro Pombo, Laura Denning and Beth Cullen.

Ifor Duncan's essay questions the land/water divide in western knowledge systems through an examination of the double disappearance of over 600 people over the construction of the Hidroituango Dam in Columbia. He argues that the recovery of the bodily remains from the river is threatened by the dam and its potential failure, reproducing the very logics that drove the original violent acts. Megnaa Mehtta's essay draws from long-term ethnographic fieldwork in the Sundarbans Delta of West Bengal. She focuses on the embankments surrounding inhabited islands and the politics of life surrounding them, arguing for closer relations between participant observation and design. Pedro Pombo's contribution unfolds the dissolution of water and land by tidal and monsoonal cycles along India's west coast: on the island of Diu, in Cambay Bay and along Goa's coast, through a cartographic practice not anchored on land, but moving with the tides. Artist Laura Denning's essay draws from her practice based PhD's engagement with fog on the Somerset Levels. Based on a short film screened at the symposium, she considers water as vapour, beyond liquidity, as a significant aspect of wetland ecosystems, and as a disorienting yet sensuous phenomenon. Beth Cullen's essay approaches the landscape of Chennai in Tamil Nadu as haunted by the water tanks that have been destroyed in the process of urban expansion. Drawing on the ghost as an important analytical tool, she examines the tanks as spectral material presences that continue to make themselves known in the city.

The second provocation, to which number of essays in this publication respond, had to do with attitudes towards and practices of managing or exploiting water in South Asia and beyond since the mid 1980's. These include two on the tank system in Tamil Nadu, one by Ranee Vedamuthu and R.K. Rukkumany, the other by Avantika Bhaskar and Jayshree Vencatesan, and those by Matthäus Rest and David Whyte.

Ranee Vedamuthu and R. H. Rukkumany provide a useful survey of the tank systems of Tamil Nadu as a way of managing monsoon cycles of wetness and dryness. Echoing Beth Cullen's essay, they analyse the consequences of tanks being perceived as wasteland and filled in for development. Avantika Bhaskar and Jayshree Vencatesan's essay examines challenges in Ramanathapuram, a water-scarce district in a drought prone region on the coast of Tamil Nadu. They stress the revival of indigenous water wisdom to address water stresses brought about by the decline of the tank system, the elimination of seasonal cultivation and the invasion of the plant species *Prosopis juliflora*. Matthäus Rest's essay draws from his work on energy generation in Nepal, asking what happens when the fluid conditions and seasonal variability of the monsoon are denied and it is reconceptualised as a steady stream to be capitalised for hydropower. David Whyte offers a brief photographic snapshot of his ethnographic work with surfers on the technologically manufactured wave pools at Surf Snowdonia and the saline dynamism of the near-shore in north Wales.

The third provocation put out by MONASS for the Monsoon [+ other] Waters symposium asked for contributions that dealt with the monsoon from the perspective of climate change and its relations with culture, politics and socio-economic policies and practices. A number of contributions in this publication respond to these themes. These include essays on floods and flooding by Mary Gearey, Theresa Zimmermann and Laura Verdelli, Nikole Bouchard's photographic essay on Bangladesh, Olusegun Stephen Titus' discussion of oil extraction in the Niger Delta

as well as Kirsten Blinkenberg Hastrup's contribution discussed above.

Mary Gearey's essay focuses on the flow of a downland spring on its journey from Chanctonbury Ring to the River Adur in the South Downs in England that has been altered by changing land management practices and local government austerity measures. She examines how this has united residents to work towards returning it to its former path, generating new forms of cultural practice, community aesthetics and political solidarity. Theresa Zimmermann's essay is based on her work in Mumbai ten years after the monsoon floods of 2005, where she explored different meanings of the floods from a social constructivist perspective. Drawing on interviews with city officials, planners, researchers and activists and fieldwork in a suburb of Mumbai that experienced excessive flooding in 2005, she discusses how attitudes towards water, land, infrastructure and responsibilities in the city have altered since the floods. Laura Verdelli's contribution is a comparative study of how flooding is approached as a hazard in urban projects in cities in France and in Chennai in India. Her interest is in the integration of flood risk regulations into 'urbanism practice,' meaning the professions, tools and interests of spatial planning, rather being left to flood prevention and management professionals alone. Nikole Bouchard's photographic essay is a narrative of water related setbacks and resilient design responses to the inundation of the coastal areas by water in Bangladesh. The material was gathered while on a travel fellowship to research resilient design strategies at a range of scales across twelve countries. Olusegun Stephen Titus' discussion of the role of popular music in resistance to oil extraction in the Niger Delta opens the discussion of climate change to wider extractive and colonial histories. He argues that music provides a powerful medium for synergy between activists and the public in promoting environmental sustainability and reclaiming access to freshwater and farming.

The fourth problematic posed by the Monsoon [+ other] Waters call for abstracts centred on questions of representation - ways of describing, through visual or other means, the monsoon, its cycles and the landscapes it creates. Essays that explore these themes in this publication are by Pamila Gupta, David Kendall and Vrinda Seksaria and the interview with Anuradha Mathur and Dilip da Cunha by Sarah Bass, Charlotte Birch and Georgia Trower.

Pamila Gupta takes John Berger's *Ways of Seeing* (1972) as a starting point for looking for creative ways of reframing the monsoon. Extending her earlier essay 'Monsoon Fever' (Gupta, 2012), she discusses photographer Ritesh Uttamchandani's recent series 'Facing the Monsoon' and a lone photograph by Arko Datto to think monsoon wetness by way of its visual attunements. David Kendall and Vrinda Seksaria's contribution to the publication is a discussion with curator Carla de Utra Mendes of their photographs for the exhibition 'Charting the Invisible' at the APT Gallery, London, UK in November 2017, a selection of which was shown at Monsoon [+ other] Waters. Their intention with this project was to reconfigure geopolitical and perceptual links between Mumbai and London through the exchange of images and techniques affected by the atmospheric, environmental and colonial residue of urban life across continents. The interview conducted with Anuradha Mathur and Dilip da Cunha by University of Westminster March students Sarah Bass, Charlotte Birch and Georgia Trower, addresses a range of questions about the methods used in their work to describe, represent and thereby reimagine wet landscapes, from archival research to drawing, mapping, photographing and writing.

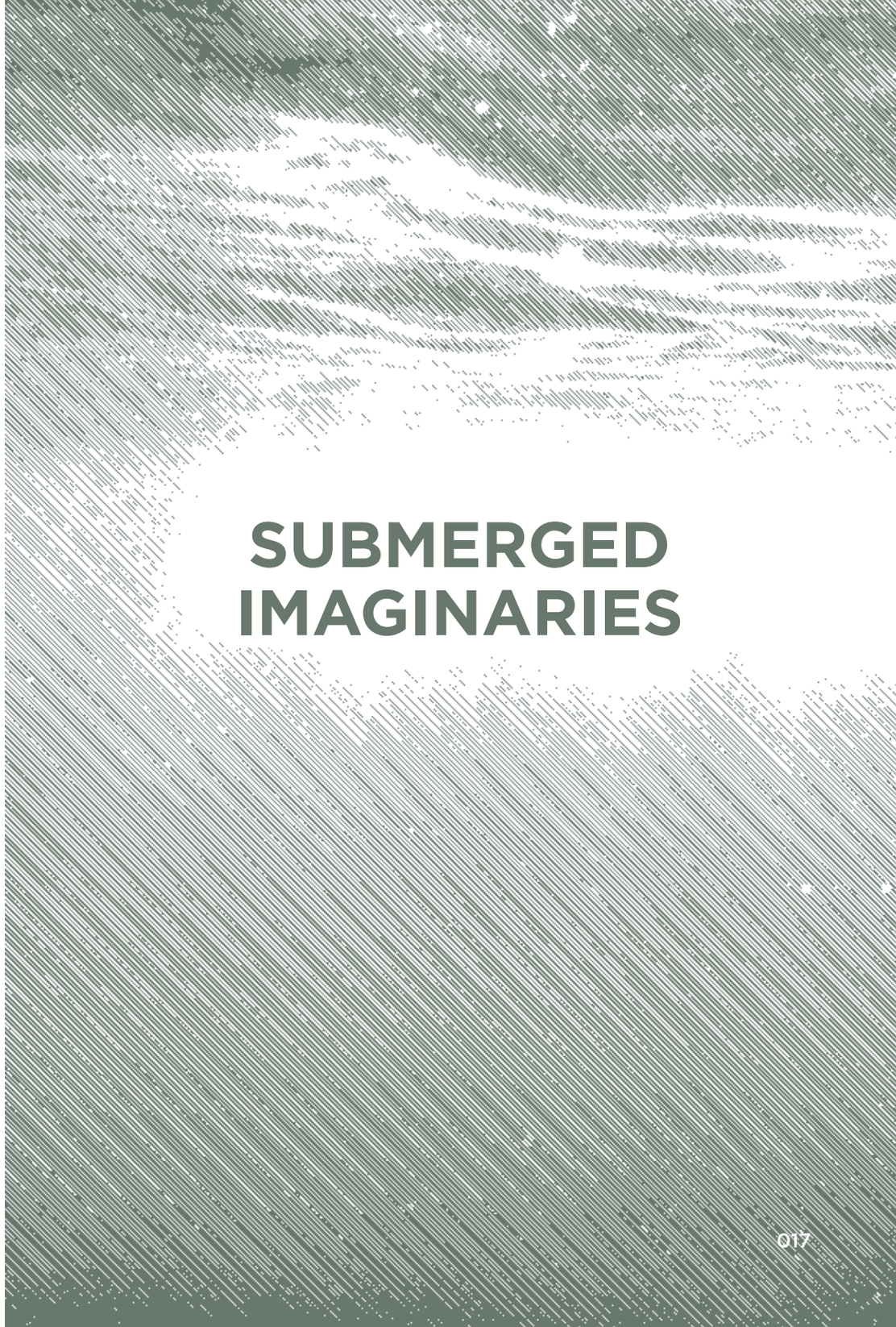
In addition to the essays, the publication contains a number of graphic contributions by students and former students of Design Studio 18 at the University of Westminster. Design Studio 18 is an MArch design studio aligned with Monsoon Assemblages for three years to test ways of framing design research and what it means to design with the monsoon. The work included in this publication are experiments in representing fluidity using computational tools (RealFlow, Rhino and Grasshopper) and include work by Constantina Avraamides, Sarah Bass, Tom Benson, Charlotte Birch, Laura Nica and Georgia Trower.

Finally, I offer words of thanks to Harshavardhan Bhat, Anthony Powis and Zahra Saleh who took responsibility as prime organisers of the Monsoon [+ other] Waters symposium; to students of Design Studio 18 for their contribution and support; to the speakers, exhibitors and attendees of Monsoon [+ other] Waters for engaging with us in developing Monsoon Assemblages' agenda and contributing to this publication; and to the Monsoon Assemblages Advisory Board, in particular Pushpa Arabindoo, David Chandler, Dilip da Cunha, Pamila Gupta, Kirsten Blinkenberg Hastrup, Simon Joss, Anuradha Mathur and Johan Woltjer who participated in Monsoon [+ other] Waters and for their ongoing critical support for the project.

Videos of all the Monsoon [+ other] Waters symposium presentations are available at: https://www.youtube.com/channel/UCamcCWHWwYL74xacO2f7nnQ.

REFERENCES

Barkin, A. (2012). *Parallel Presents: the Art of Pierre Huyghe.* Cambridge, MA.: MIT Press.
Berger, J. (1972). *Ways of Seeing.* Harmondsworth: Penguin.
Bremner, L. and Trower, G. (eds.), (2017). *Monsoon [+ other] Airs.* London: Monsoon Assemblages.
Gupta, P. (2012). 'Monsoon Fever.' *Social Dynamics* 38 (3): 516-527.
Mathur, A. and da Cunha, D. (2017). 'Wetness Everywhere.' Available at: https://vimeo.com/228719234.
Peters, K. and Steinberg, P. (2015) 'Wet ontologies, fluid spaces: giving depth to volume through oceanic thinking.' *Environment and Planning D: Society and Space* 33 (2): 247-264.



SUBMERGED IMAGINARIES

UNDERCURRENTS: SUBMERGENCE AND THE HIDROITUANGO MEGADAM

Ifor Duncan is a PhD candidate at the Centre for Research Architecture, Goldsmiths. His research concerns memory and climate politics with a specific focus on the complex relationships between political violence and watery spaces.

In January 2018, a mission convened by Movimiento Ríos Vivos (MRV), comprised of human rights lawyers, activists, artists and forensic scientists, surveyed a section of the Cauca River valley, Colombia, recording testimony from witnesses to the disappearance of over 600 people in the area directly affected by the construction of the Hidroituango mega-dam (Misión de verificación pide plan urgente de búsqueda de personas desaparecidas en el área de influencia de Hidroituango, 2018). Located in the Antioquia department of Colombia, Ituango has a troubled past, including massacres in June 1996 and October 1997 (Inter-American Court of Human Rights, 2006).[01]

In May, landslides caused by geological weaknesses in the surrounding mountainside resulted in the dam's partial failure. Complete failure in future would be devastating, flooding the town of Puerto Antioquia to a possible depth of 30 metres (Alsema, 2018). In response, MRV have focused on the urgent threat of full failure, calling for the dam's constructors, Empresas Públicas de Medellín (EPM) and the government to recognise the threat to life posed by the dam and instigate the controlled abandonment of construction. Subsequently, two members of MRV have been assassinated and 17 more have received death threats resulting from their opposition to the project (Centre for International Environmental Law, 2018a).

MRV's original opposition to the construction however, was based on four key concerns: firstly, its environmental impact on the river; secondly, to protest the construction's displacement of tens of thousands of people; thirdly, the radical change it would have on the ways of life of communities living alongside the river and finally the dam's obstruction of any possible recovery and identification of those disappeared into the river and buried on its now, or soon to be, submerged banks. These concerns meet with the Inter-American Commission on Human Rights *Truth, Justice and Reparation: Fourth Report on Human Rights Situation in Colombia* (2013) recognition that although a state has the right to 'exploit its natural resources,' infrastructure projects such as hydroelectric dams are required to 'respect and ensure the human rights of the individuals affected' (: 328, para. 828). Here, I want to draw attention to MRV's fourth point, the recovery of the disappeared, by identifying two obfuscating acts: the initial throwing of bodies into the river; and the dam project's secondary-obfuscating effect of submerging a section of river containing

the remains of the initial violent act.

Rivers have been one of the prevailing methods of disappearance during the half-century long conflict in Colombia. As Macarena Gómez-Barris (2017) has shown in her study of the connection between damming, violence, and displacement, particularly in the work of artist Carolina Caycedo, in this section of the Cauca the bodily remains contained within the river's flows are juxtaposed by the construction of the major hydroelectric facility and its potential failure. The obfuscation produced by this juxtaposition is based upon the ways different political actors conceive of rivers as a material, site, process of erasure, and, in turn, as resource through dam construction. Two forms of violence are present: killing with impunity and removal of traces, and, the control of the water as archive of political violence.

This paper pursues three lines of thought: firstly, in the section 'Heavy Rivers,' by considering how alternative ontologies of the land / water divide challenge the assumption of the obfuscating, or an-archiving capacities of rivers and other bodies of water. Secondly, in 'Dammed,' by exploring the politics of mega-dam construction as material abstraction through Jamie Linton's term 'modern water' (Linton, 2010: 8). This section considers the Hidroituango mega-dam to be an obfuscating technology, or counter-forensic infrastructure, through its exploitation of the reduction of water to the resource H2O. [02] Lastly, in 'Necropolitics of Rivers,' the dam is read alongside Taussig's interrogation of the act of disappearing bodies in water and Achille Mbembe's conception of necropolitics through the territorial tension between the control of water, land, and living and dead bodies.

Heavy Rivers

Amongst recent hydrologically centered critical research, Anuradha Mathur and Dilip da Cunha (2009) and Da Cunha (2018) have re-conceptualised received cartographic and geographic understandings of rivers. They trace the land/water divide back to its ancient construction in Western knowledge systems, and implementation in colonial mapping practices where Europena cartographers, drew fixed lines where no stable boundaryies existed. These innumerable acts of cartographic violence ignored and often attempted to alter the ways communities lived with, in, and on water. Mathur and Da Cunha's project attempts to re-vision the world through a spectrum of wetness, or what they call, the construction of 'reality in a moment of wetness' (GIDEST, 2017, 00:01:30). Indeed, Arjun Appadurai and Carol Breckenridge, in their foreword to Mathur and Da Cunha's book *Soak: Mumbai in Estuary* (2009) propose a 'wet theory' that ',,, accommodates flux, flow and other boundary-blurring phenomena at [... its] core [...] rather than at its reluctant boundaries. It means that the phenomena of motion, migration, of disturbance and of change must be, where appropriate, the building blocks of historical and geographical interpretations and not regarded as exceptional or outlier phenomena (Appadurai and Breckenridge in Mathur and Da Cunha, 2009: ix). Wet theory thus challenges the 'terracentric normativite ideal' of territory as stable, instead considering it as continually in flux (Peters et al., 2018: 2).

In this re-conceptualisation of wetness lies a fundamental reassertion of the social and political import of wet space. To think wet space as a continuity, beyond a river's surface, or the sea's crashing waves, or, indeed, as a vertical ontological spatialisation rather than flat logistical space or resource (Steinberg and Peters, 2015), is to understand that what enters water from the terrestrial is not completely erased. Indeed, the assumption of water's universal solvency has long been instrumentalised through rivers used as sewers for the traces and waste of political violence. These forms of violence, whether acute: throwing bodies into water; or slow: long term point and non-point industrial, agricultural and toxic pollution – presuppose and rely upon the ontological distinction between land and water. To completely refuse this divide would be naïve to the ontology of the criminal that facilitates these forms of violence. A reassessment of this division, however, challenges the ontology of political violence that has relied upon the obfuscating capacities of watery spaces and materialities.

If a logic that produces bodies of water as sewers is grounded in the land / water divide, then the construction of major hydroelectric infrastructures, as with Hidroituango, and its transformation of the height and flows of the river, reinforces this divide. Reproducing the very logics that originally led actors of violence (the paramilitary, soldier, guerrilla, criminal) to disperse unwanted remains into the river.

Dammed

In the critical literature of water and power, authors often attempt to reveal a secondary principle operating under the surface of primary assumptions. Peter Gleick (1993: 79) has surveyed the ways water and water-supply infrastructures are increasingly the instruments of conflict as well as its object, particularly in the context of growing human populations, demands for fresh water, and climatic changes. For Philip Steinberg (2018: 218) water's relationship to power is not only distributive but generative or 'world-making,' and thus the source of water's power is in its very fostering of the 'capacity to change the way that we think about the world' (ibid.: 226). Likewise, Jamie Linton (2010) considers water to be political as much in relation to who gets it as to the discourses dictating the dominant ways of knowing and living with water. These critical texts reflect water's multiplicity and attempt to undermine power's limiting of knowledge and access to characteristics that could be adopted as modes of resistance.

Linton (ibid.) outlines water's place in the modernist project through three developments: firstly, the discovery of the formula H2O in the 1800s, followed in the 1930s by the prominence of Robert Horton's concept of the hydrologic cycle, and concurrent boom in dam construction in the United States. The combination of these developments effectively abstracted water from lived experience into a flat laboratory substance, or the supposed sanitised purity of tap water (Illich, 1985). While it is through the tap that water is experienced in water rich nations, Linton and Illich respectively show the importance of resisting this sanitised idea of water as resource, not merely to repeat romantic motifs of water's mysteriousness but to resist its complete abstraction and reduction to resource and consequent abuse.

Through the entanglement of dam construction with modernist reductions to energy resource, Linton (ibid.). diagnoses the hegemonic way of knowing water as 'modern water,' in which all historicity or social and ecological contents and relations have been removed. He claims that reducing water to a 'homogenous chemical compound' (ibid.: 18), H2O, had both spatial and temporal ramifications removing water's political and social agency. So much so, he argues, that as modern water 'all water was, is, and always will be H2O' (ibid.). This also has lived ramifications, as the universalising and dehistoricising effect of H2O refuses all other ontologies and ways of knowing and living with water.

The Hidroituango dam project produces its very own dehistoricising effects. It reduces the Cauca and the history of violence held and communicated through its flows into modern water through the wattage of energy extraction. In this case flow rate becomes the dominant way of knowing water and the State's attempt to erase all of the river's social and material resonances to violence through the engineering and turbines of hydropower. Indeed, as Achille Mbembe (2002: 26) asserts, States need to continually 'destroy the 'debris [of their archives]' and 'tam[e], by violence if necessary, [...] the demon that they carry.' Where it is widely acknowledged that archiving is a requisite of nation-building, in the construction of Hidroituango, the State and its subsidiaries pursue obfuscating and anarchival acts in the attempt to 'destroy the [human] debris' of violence dating back to the Ituango massacres and further (Inter-American Court of Human Rights, 2006) through the hydro-forming of the landscape and generation of electricity.

By flooding the valley upstream of the dam, the project makes a double intervention in possibilities for remembrance. Firstly, it displaces the population who remember the events, and, secondly, it submerges the material contents of the river under the guise of the abstraction of water'sflow rate, reducing any possible forensic study. However, as Gómez-Barris (2017: 15) contests, an inverted perspective produced by activists and artists alike, or a 'fish-eye episteme,' can subvert the 'extractive gaze' that sees only energy and H2O and can reveal the social and ecological weight of the water. Indeed, opponents to the project, such as Movimiento Ríos Vivos, declare that concerted memorial practices resist the reduction of the river's materiality to hourly wattage or chemical formula (Misión de verificación, 2018).

The Necropolitics of Rivers

The place of water as a classical material of memory and forgetting is founded on the respective distinction between land's stability and water's instability. In reference to Plato's verse on the *Lethe*, the river of forgetting, Bruce Lincoln (1982: 19) terms Indo-European cosmologies 'funerary geography.' The funerary hydrography of the river graves of the Cauca and Magdalena equate the submersion of the body to a double death. Juan Manuel Echavarría's 2013 film, *Reqiuem NN* focuses on the tradition of adopting anonymous bodies that wash up at the town of Puerto Berrio in a bend of the Magdalena. Oscillating between the river as grave and the town cemetery, Echavarría's film depicts Puerto Berrio as an extension of the river grave. In an early scene local fire captain Carlos Vega speaks to camera about the process of retrieving bodies washed-up at the town:

> *The remains of those taken out of the Magdalena river are in the cemetery. But those who were not taken out, due to other circumstances, its hard to know where those people are, what happened to them. Their families are waiting for them, but the Magdalena River is their grave.*

As the shot cuts to a view from the bridge onto the foaming eddies of the river below, Vega continues, 'That makes it even crueler. After killing them, they throw them into the river. It's a double murder.' [03] Contemplating the river, Vega's words echo eighteenth-century Neapolitan philosopher Giambattista Vico's (1725) reading of the etymological root of *humanitas* from the Latin for burial, *humando*. Vico's etymology is famously referenced by Robert Pogue Harrison as a notion of humanness defined by the promise of burial and its associated rituals.

> *Humans bury not simply to achieve closure and effect a separation from the dead but also and above all to humanise the ground on which they build their worlds and found their histories [...] to be human means above all to bury (Harrison 2003: xi).*

Evident in this claim is a merger of nature / culture requiring humans to be inhumed in the ground as a reaffirmation of the connection between the two. Puerto Berrio's devoutly catholic community refer

to the submerged, un-inhumed dead as being in purgatory, in a space that cannot be human. In this theological understanding the river is not just the route to the other world but is a space of long and torturous interruption or suspension. The submersion, reinforcing the land/water divide, is thus the murderer's last de-humanising act.

Michael Taussig (2012) similarly adopts Vico's etymology in 'Excelente Zona Social,' one of his studies of the swamps of northern Colombia. As he and his companions traverse the swamps by boat taxi, his river guide sings a violent *vallenatos* [song of protest] about bodies thrown by paramilitaries into the very river upon which they are afloat:

> *Why do they put the bodies in the river? I ask. Because they won't let them be buried, [a fellow traveller] replies. [...] Life is important, but I get the feeling burial is more so. Don't Vico and Bataille see in burial the first sign of culture, the first sign of being human? Therefore not to bury and, even more, to refuse burial, strikes at the heart of life, human life that is, what separates whatever it is we designate 'human' from nonhuman, meaning not only animal but also the inhuman. Yet the inhuman is every bit as religious, every bit as sacred, as the pious rites that help move the corpse from its frightening negative state to that of hallowed ground (Taussig, 2012: 512).*

Taussig directs his reader to the long theological basis of the land/water divide in retroactive human defining funerary practices. Likewise, the rites practiced at Puerto Berrio shift the body, and soul, from a 'negative state' (the river), to the 'hallowed ground' of the cemetery. As the recovered remains are often dismembered, this funerary territorial re-inversion is not so simple. Adding to the theological significance, Taussig continues by weaving in the territorial implications of the double act of dismemberment and submersion.

> *A body is the ultimate territory and a chopped up corpse adrift in the river is the absolute denial of such territory, the deepest possible exile of the soul. Thus, does deterritorialisation achieve its most definitive state of nonbeing. Could this be why the counterforce claiming territory as mythical power is now every day ascendant in Colombia, after two decades of paramilitary violence aimed at dismembering both land and body? (Taussig, ibid.: 513)*

Taussig reads the swamps as a space where violence has long dismembered the territorial complex of land and body. In the case of Hidroituango mega-dam, both living and dead populations along this stretch of the Cauca are heavily imbricated, through displacement and direct violence, in the control of resource and transformation of the war-torn territory. The attempted erasure of the history of violence becomes enveloped in the control of territory for resource extraction. Thus the dam's caesura in the river's flow contributes to both the deterritorialising power of the flooding river upstream and reterritorialising downstream where the flow is dramatically reduced. With this internal colonial act, EPM, as de facto state actor (Parkin, Daniels and Ebus, 2018), displaces and hydro/terra-forms the region. The hydroelectric project thus manipulates the physical infrastructure of energy production as a counter-forensics to submerge the dead further from 'hallowed ground'.

Taussig's commentary on river disappearances brings us back to the funerary hydrography of Puerto Berrio and Movimiento Ríos Vivos' mission to discover the bodies buried in the Cauca. Evident in both cases is the existence of what Mbembe calls the necropolitical regime: 'to exercise sovereignty is to exercise control over mortality and to define life as the deployment and manifestation of power. [...] Imagining politics as a form of war, we must ask: What place is given to life, death, and the human body (in particular the wounded or slain body)? How are they inscribed in the order of power?' (Mbembe, 2003: 11). Building on Mbembe's argument, Deborah Posel and Pamila Gupta (2009: 301) similarly consider sovereignty's pursuit of war on both life and death, and, consequently on the corpse: 'How to dispose of the dead is as politicised, and as integral to the practice of sovereignty, as the act of determining who dies and how.' In the Hidroituango case two forms of political violence are in confluence: firstly, the wounded and slain body and secondly, its concealment through the violent exercise of power in the form of water control. The rights of the living and the dead are secondary in the face of multiple parties wrestling for sovereignty in the form of the extraction of electricity from the river: the government, its subsidiary EPM, paramilitaries, guerrillas, multi-national corporations.

In the mega-dam's necropolitical order of power, the corpse sits somewhere alongside the precarious living who are threatened, in-turn, by the possible and seemingly imminent wave produced by the dam's possible failure. The Inter-American Court of Human Rights' Fourth Report on Human Rights Situation in Colombia (2013: 76, para. 115) likewise commented on the State's need to 'prevent obstruction of the recovery of bodies in those places' where dam construction inhibits such recovery of the disappeared. In this vein, an activist blog post from June 4th 2018 mourned the violence of the dam construction upon the memories of the dead and disregard for the living enacted by the government and business interests in the dam project (Movimiento Rios Vivos, 2018). They described the dam construction as damage to memory, and disrespect

to both the living and the dead.

Conclusion

The Hidroituango mega-dam places into urgent juxtaposition water as resource against the physical remains and living memories of decades of violence against rural and indigenous communities. The dam, as obfuscating technology, transforms the territory and thus abstracts the traces of violence into vast new lagoons, displacing villagers, and with them memories, all in the name of 'progress', profit, and extraction. The dam's break in the river flow through the embankment of rocks and earth violently imposes the land/water divide as an assault on the existence of counter-knowledges of the river and remembrance of the violence enacted in and around the water. Further submersion, as result of the dam's raising of river levels, inflicts what Puerto Berrio's fire captain Carlos Vega might call a 'third murder,' where after killing them, and throwing them in the river, the flooding of the valley further reduces the chance of their return to 'hallowed ground' (Echavarría, 2013). To rethink and resist the ontological reduction of rivers to resource enables the possibility that care for rivers, their flows and their contents, as endeavored by MRV and others, is care for both the living, and the dead.

NOTES

01 The case concerns two massacres of suspected guerilla collaborators by the paramilitary group known as the 'United Self-Defense Forces' under the supervision and, indeed, with the participation of 'State Agents' in the municipality of Ituango. The first massacre took place in La Granja on the 11th of June 1996, the second took place in El Aro between the 22nd and 26th of October 1997. (Inter-American Court of Human Rights, 2006: 13, para. 64).

02 Here counter-forensics is used inline with Forensic Architecture's definition of a method of frustrating forensic-scientific investigation. (Forensic Architecture, 2011-2021).

03 Quoted from the film's English subtitles.

REFERENCES

Alsema, A. (2018). 'Colombia preparing for possible rupture of country's largest dam.' *Colombia Reports*, 9 June. Available at: https://colombiareports.com/colombia-preparing-for-possible-rupture-of-countrys-largest-dam/.

Appadurai, A. and Breckenridge, C. (2009). 'Foreword.' In: Mathur, A. and da Cunha, D. *Soak: Mumbai in Estuary*, viii-ix. New Delhi: Rupha & Co.

Centre for International Environmental Law. (2018a). 'Comment on Movimiento Ríos Vivos Antioquia's Activism Regarding Hidroituango.' *CIEL*, 18 May. Available at: https://www.ciel.org/news/comment-movimiento-rios-vivos-antioquias-activism-hidroituango/.

Centre for International Environmental Law. (2018b). 'Environmental Authority Halts Operations on Hidroituango Dam in Colombia.' *CIEL*, 03 July. Available at: https://www.ciel.org/news/environmental-authority-halts-operations-hidroituango-dam-colombia/.

da Cunha, D. (2018). *The Invention of Rivers: Alexander's Eye and Ganga's Descent*. Philadelphia, PA.: Penn Press.

Forensic Architecture. (2011-2021).'Counter Forensics.' *Lexicon*. Available at: https://www.forensic-architecture.org/lexicon/counter-forensics/.

GIDEST. (2017). Anuradha Mathur and Dilip da Cunha - Wetness Everywhere. [Online Video]. 7 August 2017. Available at: https://vimeo.com/228719234. [Accessed: 1 March 2018].

Gleick, P. H. (1993). 'Water and Conflict: Fresh Water Resources and International Security,' *International Security* 18 (1): 79-112.

Gómez-Barris, M. (2017). *The Extractive Zone: Social Ecologies and Decolonial Perspectives*. Durham, NC.: Duke University Press.

Harrison, R. P. (2003). *The Dominion of the Dead*. Chicago: University of Chicago Press.

Illich, I. (1985). *H20 and the Waters of Forgetfulness: Reflections on the Historicity of Stuff*. Dallas TX: Dallas Institute of Humanities & Culture.

Inter-American Court of Human Rights. (2013). *Truth, Justice and Reparation: Fourth Report on Human Rights Situation in Colombia*. Available at: http://www.oas.org/en/iachr/reports/pdfs/colombia-truth-justice-reparation.pdf.

Inter-American Court of Human Rights. (2006). *Case of the Ituango Massacres v. Colombia, Judgment of July 1, 2006, Preliminary Objections, Merits, Reparations and Costs*. Available at: http://www.corteidh.or.cr/docs/casos/articulos/seriec_148_ing.pdf.

Ituango Hydroelectric Power Project, Colombia (2018). *Power Technology*. Available at: https://www.power-technology.com/projects/ituango-hydroelectric-power-colombia/.

Lincoln, B. (1982). 'Waters of Remembrance and waters of forgetfulness.' *Fabula* 23: 19-34.

Linton, J. (2010). *What is Water? The History of a Modern Abstraction*. Vancouver: University of British Columbia Press.

Mathur, A. and da Cunha, D. (2009). *Soak: Mumbai in Estuary*. New Delhi: Rupha & Co.

Mbembe, A. (2002). 'The Power of the Archive and its Limits.' Trans. J. Inggs. In: Hamilton, C., Harris, V., Taylor, J., Pickover, M., Reid, G. and Saleh R. (eds.). *Refiguring the Archive*, 19-26. Dordrecht, Kluwer Academic Publishers.

Mbembe. A. (2003). 'Necropolitics.' *Public Culture* 15(1): 11-40.

Misión de verificación pide plan urgente de búsqueda de personas desaparecidas en el área de influencia de Hidroituango. (2018). *Movice*, 23 January. Available at: http://www.movimientodevictimas.org/?q=content/misi%C3%B3n-de-verificaci%C3%B3n-pide-plan-urgente-de-b%C3%BAsqueda-de-personas-desaparecidas-en-el-%C3%A1rea-de.

Monsoon [+ other] Waters. (2018).

Movimiento Rios Vivos. (2018). 'Lo que debes saber sobre Hidroituango.' *Movimiento Rios Vivos*. Available at: https://riosvivosantioquia.org/no-a-hidroituango/lo-que-debes-saber-sobre-hidroituango/

Parkin Daniels, J. and Ebus, B. (2018). 'Colombians who once fled war now forced to run from catastrophic flooding.' *The Guardian*, 12 June. Available at: https://www.theguardian.com/world/2018/jun/12/colombia-river-cauca-breach-flooding-farc.

Peters, K., Steinberg P. and Stratford, E. (2018). 'Introduction.' In: Peters, K., Steinberg P. and Stratford, E. (eds.). *Territory Beyond Terra*, 1-14. London: Rowman and Littlefield.

Posel, D. and Gupta, P. (2009). 'The Life of the Corpse: Framing Reflections and Questions.' *African Studies* 68 (3): 299-309.

Juan Manuel Echavarría. (2013). *Requiem NN*. [DVD]. Colombia / Canada: Lulo Films and Fundación Puntos de Encuentro.

Steinberg, P. and Peters, K. (2015). 'Wet ontologies, fluid spaces: giving depth to volume through oceanic thinking.' *Environment and Planning D: Society and Space* 33: 247-264.

Steinberg, P. (2018). 'The Power of Water.' In: Coleman, M. and Agnew, J. (eds.). *Handbook on the Geographies of Power*, 217-228. Cheltenham: Edward Elgar.

Taussig, M. (2012). 'Excelente Zona Social.' *Cultural Anthropology* 27 (3): 498–517.

UNEMBANKING HABITATIONS AND IMAGINATIONS: THE POLITICS OF LIFE AMIDST THE EBBS AND FLOWS OF THE SUNDARBANS FORESTS OF WEST BENGAL

Megnaa Mehtta is a PhD candidate in the Department of Social Anthropology at the London School of Economics and Political Science. She is an environmental anthropologist working at the intersection of political ecology and global conservation. Her research is based out of long-term ethnographic fieldwork in the Sundarbans mangrove forests of West Bengal, India. Her research proposes new conservation paradigms that put vernacular forms of forest governance in conversation with contemporary global conservation discourses, arguing for the inseparability of ethics, politics and economics in relationship to ecology.

Dedicated to a sublime *joon* storm.[01]

Introduction

This essay focuses on the embankments surrounding inhabited islands in the Sundarbans Delta of West Bengal, and the politics of life surrounding them. In the process, I propose how the methodology of participant observation can animate design by attuning it to the minutiae of inequality, the geography of poverty and local politics around livelihoods and land. In turn, and as crucially, I lay out the ways in which design can influence anthropology by urging it towards more speculative and imaginative thought, decolonising knowledge, and rerouting it through other histories, toward both literal and metaphorical unembanked possibilities.

Shifting rivers, shifting forests

The Sundarbans are a tidally active mangrove forest with 52 inhabited islands and a population of 4.5 million. The majority of these inhabitants are political and ecological refugees from Bangladesh or other parts of West Bengal, as well as *adivasis* (indigenous communities) who were brought by the British for the cultivation of rice paddy. In addition to people, the forests and river creeks are home to a large number of tigers, crocodiles, sharks, snakes, and numerous species of birds and fish. It is a unique landscape. The forest is a river. Every few hours the forest cover swells and shrivels with the ebbs and flows of twice-daily tides. Bali Island, with population of 40,000 people, where I conducted 22 months of fieldwork, along with its neighbouring islands on the southern delta, experiences the daily erosion and accretion of soil. Aerial images show the shifting of land, but one doesn't need GIS mapping to see these changes. Sitting on the edges of the island, one can experience the river inching closer. As the water retreats, the gnarled pneumatophoric roots of the mangroves are exposed in their convolutions, only to disappear again in a few hours. It is no surprise that it is on these terrains that

Fig.01 A newly constructed concrete wall in a shifting landscape of high tide and low tide, Bali Island, Sundarbans. Megnaa Mehtta.

mudskippers - fish that are part terrestrial - flourish. New mudflats appear, while others disappear. The landscape changes every season, every two weeks with the spring tide and neap tide, and every six hours with the high tide and low tide. Amid such churning, what is land and what is water, what is river and what is sea, what is salty and what is sweet are in constant flux, and ultimately false distinctions.

It was the month of June, the period known as *kal baisakhi* where days and nights are beset with thunder, lighting and rain, in anticipation of the monsoons of the Bay of Bengal delta. The wind had picked up pace. Trees swayed as if drunk. The color of the sky changed to an ominous ash grey. With the menacing vibrations of construction machines, punctuated by the sound of an approaching thunderstorm, Prashanjit was barely audible. Yet, raising his voice, adamant to tell me as much as he could, he said with pride, 'This is nothing like you've seen before, this is based on designs from the Netherlands. This is a modern embankment, not like the usual mud embankments (*bandhs*).' He was the *Up-Pradhan*, a senior official of the local village government of Bali Island.

At the time that I was conducting fieldwork, the first concrete embankments were being built on Bali Island. For the *Up-pradhan* and his various contractor friends these walls represented the arc of progress, and he had been keen to show off this work to me. We stood on top of the half-finished embankment, which he described by repeatedly using the English word 'modern' and the Bengali word *notun* meaning new. He spoke at length about the budget, the costs, the dimensions and materials of this particular construction project. He regarded himself as one of the more successful local government leaders for having transported such huge machinery, massive earthmovers and concrete mixers, to an area with barely any roads, no electricity or hospitals. He continued, 'Do you know....in the Netherlands half their country would sink if they didn't build their embankments? We here in the Sundarbans need to build like them."'

There is an assumption that embankments are absolutely essential for the Sundarbans inhabitants to survive. The ideology of embankments as lifelines has only been strengthened as climate change has become one of the most urgent issues of our times. Concepts such as resilience, adaptation and the plight of ecological refugees have moved centre stage, especially in internationally funded development projects and money allotted toward resilience research. As a direct consequence, the Sundarbans Embankment Reconstruction Project has recently allocated a colossal Rs 5,032 crore (GBP 562 million) (Bera, 2012) to build what are referred to as modern cement and block embankments. The embankments will be five metres high and 30-40 metres wide. Their surfaces will be covered by polypropylene sheets. They will cover 3,500 kilometres of island perimeters, in an attempt to replace older and what are considered weaker *bandhs* (mud embankments).

As we walked along inspecting the wall, Prasanjit introduced me to someone named Jatin, who worked for the company that had been contracted to build this embankment. From their body language I gathered the two were good friends. After a long handshake and friendly slaps on the back, the two lit cigarettes and started chatting with each other. I noticed that they both had on very similar black patent leather shoes. The shiny shoes were almost as incongruous to the marshy riverbed as the embankment felt to the surrounding landscape. In a village where homes are made of mud and hay and the landscape is dotted with rice fields and ponds, these imposing and imposed concrete walls looked alien. I listened to the two of them exchange pleasantries. Contractors and local village officials, it is known, have a symbiotic relationship when it comes to the work of 'development.' According to Bera (2012), for every kilometre of embankment built in the Sundarbans the contractor gets between 5-18 crores (GBP 0.6–2 million). It is a well-known fact that some part of this massive amount is shared with local village officials.

I asked Jatin if he had worked on many other embankment projects in the region. What followed was a long list of projects his company had been contracted to build: big highways, bigger bridges, a power plant,

and even a floating 'VIP' hotel. He boasted that in comparison with the engineering marvels he had worked on in the past, this embankment was small fry. In the end of a long monologue, the answer to my question was that not only had the company never built an embankment before, but also Jatin and his team had never set foot in the Sundarbans until the previous year when their company won the bid for this project. Taken aback, I wondered to myself how the company would be able to design the embankment keeping in mind the particular ecological specificities of this region.

Almost as a premonition of greater storms to come, or as an answer from elsewhere to my question, a few large drops of rain fell to the ground. A purple bolt of lightening shot through the sky. The three of us looked up in unison. I zipped my bag, worried about my field notes getting wet. Jatin moved his Samsung smartphone from his breast pocket to his trouser pocket. Prasanjit insisted we set off for our respective homes. Keen to know more about the company that had been contracted to build the embankment, I tried to pursue our conversation but by this point the *Up-Pradhan* was satisfied that he had shown me the 'modern' construction his office was undertaking. He warned, all knowingly, 'You don't understand....these are not ordinary storms, you must get back home. It takes a second in these parts for everything to go into the belly of the river (*nodir gorbey*).' With a few other words of caution, the two whizzed off on Prasanjit's motorbike to his house in the center of the island. I cycled back to the neighbouring village where I was based, passing several kilometres of mud embankments. Having just heard the timeline for construction from Jatin, I realised that in a year's time or possibly less all of these homes hugging the embankment would be displaced and their land would be acquired to build a much broader, wider and supposedly modern embankment.

It was almost uncanny, and certainly ironic, that just as they waxed eloquent about the strength of this wall they were building, the force of the typical *kal baisakhi* storm about to unfurl sent the two scurrying off into the island's interior. As the trees trembled around me and lightening bolts illuminated the otherwise dark expanse of forests stretching ahead, I had the sense that everything could indeed, in a matter of seconds, wash away into the belly of the river. The rain was coming down hard and the wind was so strong that I could barely move forward. Soaking wet, concentrating hard on the path on which I was cycling along the river's edge, the storm - as storms often have the power to do - made me feel at once insignificant and in awe of the force of the wetness around me, the sky, the air, the river, the road. Unsurprisingly perhaps, it is in experiencing such storms, definitions of the sublime come to mind. Edmund Burke (1998:24) defines the sublime in oxymoronic terms: a 'delightful horror,' a 'sort of tranquility tinged with terror,' for him it was 'the strongest emotion the mind is capable of feeling;' similarly for Kant

Fig.02 A kalbaisakhi storm, Bali Island, Sundarbans. Megnaa Mehtta.

(1987) the sublime was a combination of pain and pleasure.

Kal baisakhi storms, overwhelming aesthetic experiences, which are sublime in their vitality, simultaneously wreck unfathomable sorrow. Not too long ago, in May of 2009, Cyclone Aila had destroyed the homes and property of many thousands. With a death toll of over 200 people, the cyclone damaged over 700 kilometres of embankments. Many of these were concrete embankments just like the modern embankments being built on Bali Island. Even individuals like Prasanjit who champion the progress of Dutch-style dikes, in the face of heavy winds, thunder and lighting, and the living memory of cyclones such as Aila, acknowledge that little if anything can keep out the storms. This awareness of the strength of natural forces and the desire to conquer them is part of a longer history of doomed infrastructural megaprojects in the region. In the 19th century, Port Canning - the closest small town to the Sundarbans - was built despite many warnings against its construction. Named after Lord Canning, it was designed to rival Singapore's port and replace Kolkata. This huge investment came to naught when the Matla river surged and everything was ruined (Mukhopadhyay, 2016). The design imagination of the British, based on European riparian systems, failed to adapt to the assertive rivers, monsoon and cyclonic winds of the Bay of Bengal delta. It seems as if modern day stakeholders pushing for concrete embankments are motivated, much like the British were, by a combination of factors: hubris, denialism and self-interested profit.

Fig. 03 Modern embankments, Bali Island, Sundarbans. Megnaa Mehtta.

Hunter, a colonial administrator who authored the statistical account of Bengal, wrote in 1875: 'The inundation works cruel havoc among [the] low-lying isolated villages ... the more the forest is cleared away, the smaller the barrier placed between the cultivator and the devouring wave' (Hunter, 1973: 55-56). In the 19th century, as island reclamation projects were being expanded, there was an acute awareness that clearing the forests would generate incalculable risks. However, the main motivation was to generate revenue, and so despite the tragedies that might befall both human and animal inhabitants, the forests were cleared at such a speed that the Sundarbans were reduced to half their original size.

Analogous logic informs the actions of people like Prasanjit and Jatin, extending upward to their enablers in government, engineering firms, contractors, international NGOs, and climate change adaptation funding bodies, all of whom have a stake, albeit of a different kind, in the building of embankments. For development funds to flow, or for vote banks to deliver, embankments - the more modern the better - must be built.

The geographic minutiae of inequality

Monsoons punctuate everyday life, rhythms of work, sleep and song. The *malhar* - the atmosphere created by torrential rains - takes over both moods and movements, of people, birds, animals and the branches of trees. On Bali Island during the monsoon months, rice fields completely submerge with just the tiny green tips of paddy visible from afar. Ponds (*pukkurs*) and lakes (*khaal*) customarily overflow. It is impossible to tell water bodies from territories of land. Wetness seeps into every crevice. Clothes never dry in such dampness and new life sprouts from the strangest of places. Farming requires one to wade knee-deep in mud. Roads become rivers and so getting around via the dirt paths requires that one claw the earth with one's nails, like a crab, so as not to slip.

This is the season when snakes and snakebites abound. In these months, every household experiences a degree of illness. Children fall sick with bad stomachs and entire neighborhoods of women and men complain of fevers and headaches. Bali Island, home to 40,000 people, doesn't have a hospital or even a primary healthcare center. During the monsoons the chances of small illnesses turning into fatalities is much higher because it is impossible to travel too far too quickly. The death toll due to venomous snakebites is highest during these months.

Long before the global alarm around climate change began, the Bay of Bengal experienced some of the country's strongest storms, tidal surges and cyclones at this time of the year. But while it is undeniably a dangerous time of the year, it is also the most vital period for Sundarban

residents who obtain their largest source of fresh water for the year. The rainwater-fed ponds surrounding every house are used for agriculture, for farming fish, and for daily household activities like washing and bathing. More so than anywhere else, the monsoons here embody the fragile balance between scarcity and abundance, salt water and fresh water, death and regeneration.

Crucial to the relationship of fear and hope with regard to the monsoons is that it does not play out uniformly in every part of the Sundarbans, or even within one island. I first noticed this sometime in September 2017 when it had been raining for four days continuously. Alpana di and I had just rearranged the pots placed in strategic locations to catch the rivulets running down the mud walls of our house. Despite these pots, there were several puddles inside our home. An acquaintance, a man named Mrinal, whose house is located in the interior of the island adjacent to the village bazaar had stopped by for a chat. He was praising the rains. We listened to Mrinal, sharing with much excitement, how he had planted the most expensive variety of rice this year, a variety called *Gobindo Bhog*. In preparation for cultivating a second crop he had also deepened his ponds so as to have a bigger catchment for rainwater. The plan was to use a water pump, powered by a generator - for the island has no electricity - to pump water from the pond for a winter harvest of paddy. For most people living on the river's edge, the unabated rain in the past few days had been a cause for deep concern, not something to celebrate. All I had heard, until Mrinal had visited us, were complaints. Neighbors lamented the dampness, the mud walls that were so wet that moss had begun to grow on them, and how their hay roofs were close to caving in because of the sheer force of the rain. As Mrinal left our house, Alpana explained with a tone tinged with slight bitterness that not only did he live in a brick house (*paccka baadi*), but was also the owner of a clothing store in the village bazaar. In addition, he had a sizeable amount of agricultural land. She then said reflecting on our conversation much of which had centered on the theme of the monsoons, 'I'd hate to be the rain, it is constantly blamed (*shobh samay dosh diya jaye*) of being either too little or too much, too late or too early... but it can never be right.' Alpana and all her neighbours on the river's edge had no land and so the rains were not a concern in relation to the cultivation of paddy. However, with their homes so close to the river, there was always the much more pressing anxiety of a breach, a tidal surge or a devastating cyclone during this time of the year.

An important aspect of the geography of each Sundarbans Island is that the poorest, often belonging to the lowest caste groups, live on the river's edge. These people are frequently landless and depend on the forest, known colloquially as 'doing the jungle', for their livelihoods. They are fishers, crab collectors and honey collectors. For those who 'do the jungle,' these months bring a standstill to their work. The monsoon also brings with it more extreme anxieties. The homes of the poor on the river's edge, or *nodir dharey*, are often the first to swim away during excessive rain, while those who own land - the shopkeepers, schoolteachers, and local politicians like Mrinal and the *Up-pradhan* - live in the interiors of the island next to the village bazaar (see Jalais, 2014). For interior households with land, and therefore relatively bigger ponds, it was in anticipation of the monsoon that ponds were dug even deeper to harvest more rainwater. They would act as a catchment for excess rainwater, prevent flooding and feed a second crop of paddy. Customarily, it is only these households that have the material access to generator-powered water-pumps. There is therefore a huge divide, socio-economically, between those who live on the peripheries, by the river's edge and those that live in the interiors of the island and the monsoon months only exacerbated this divide within the same island.

The rains create gradients of joy and grief which are by no means homogenous, and which map onto local geographies, one's proximity to the embankment and the river's edge, relationships to certain kinds of labour - fishing versus farming or being a shop owner, and ultimately also to one's material conditions – brick homes or mud homes, or homes with raised platforms. These are minute details, yet crucial, and are obtained from participant-observation, the work of learning about the lives of others by embedding oneself in those lives, and this knowledge has implications for design - enriching it or at times creating challenges to the ease with which transformations might be actualised.

The wrong side of the embankment

Land acquisition and compensation is one of the more contested issues of embankment construction (Mukhopadhyay, 2015). Families quoted promised compensation between 1-5 lakhs [1000-5000GBP] supposedly reflecting the value of the land, but many had not received anything near the amounts promised. The unanimously held viewpoint was that the compensation received was woefully insufficient to buy land in the interior parts of the island. Real estate in the interiors of the island commands a safety premium, just as further 'up' islands, referring to the villages and towns towards Kolkata, are safer and more expensive than the 'down' islands of the delta (Jalais, 2014). While new tourist lodges with river views are defying this pattern, it still holds for Sundarbans residents.

For the majority of those who live on the river's edge who depend on the forest for their living, the, the adequacy of the compensation amount is beside the point since they have no land in their name. The really vulnerable of Sundarban residents have their homesteads on *khaas jameen*, government land that they don't own and to which they only have squatter rights. On visits to the modern embankment during fieldwork,

Fig. 04 A village colony on the wrong side of the embankment, Bali Island, Sundarbans. Megnaa Mehtta.

I noticed that an entire village colony had formed on the wrong side of the embankment a few months into its construction. Several homes were not behind the protective wall but in front of it, literally beside the river. This meant that the most vulnerable households of the island were being rendered even more vulnerable because of a wall for the supposed benefit of the entire village.

Bimal and Parimal Mondol are two brothers whose homestead was on *khaas jameen*. When asked about having to shift their homes even closer to the river, they expressed their fear and hopelessness. Bimal said, 'Yes we are scared, but what will we do. Fear won't help us. Where will we go?....There is nowhere to go.' For many people in the Sundarbans, this is the fourth time that they are rebuilding their homes from scratch in their lifetime. On the west side of Bali Island, where work on the modern embankment hasn't yet begun, an equally bleak scenario presents itself. Mrithunjay Das and his wife Shanti Das belong to the Moochi caste community, one of lowest caste communities of India formerly known as 'untouchables.' As Mrithunjay and Shanti's household is on the side of the island facing heavy erosion, they have witnessed several embankment breaches and collapses. As one embankment collapses, the government irrigation department acquire land to build another ring of embankments. At the time that I did fieldwork the fourth ring embankment had collapsed and sacks of sand had been stacked as a temporary measure to prevent

Fig. 05 'Into the belly of the river,' land accretion and erosion, Bali Island, Sundarbans. Megnaa Mehtta.

the salt water from coming in. For this particular household all their land has been eaten up by the devouring tide. They and families like them have received no compensation and have no legal recourse.

The extended Das community, composed of several brothers, their wives, children and grandchildren, have been pushed out of the Sundarbans and are now living in impermanent settlements in towns along the train line between Canning and Kolkata. Those who remain - Mrithunjay and Shanti - are pushed into the belly of the river not by natural disasters, but by disasters of development.

Mud vs. concrete / nature vs. technology

The best window into the intricate politics of embankment making and breaking in the Sundarbans is Mukhopadhyay's book *Living with Disaster: Communities and Development in the Indian Sundarbans* (2015). Mukhopadhyay traces the dynamics of complicity, cooperation, and cooption that play out in the highest rungs of government and locally. While his work is seminal to our understanding of both development projects in the Sundarbans and the discourses that require and perpetuate under-development, it is a line of thinking that still holds embankments to be lifelines of the Sundarbans.

Fig. 06 A mud embankment or 'bandh,' Bali Island, Sundarbans.. Megnaa Mehtta
Soon 3,500 kilometers of island peripheries will be replaced by concrete, cement and cinder blocks.

In addition to the scholarly work of Mukhopadhyay, today the loudest criticism of modern embankments comes from certain environmentalists who cite the ecological destruction that concrete embankments will cause. They perceive a threat to the pristine nature and wildlife of the Sundarbans. Anurag Danda, head of Sundarbans and Climate Adaptation programme of WWF India, writes that the concretisation of the river's edge will inhibit the use of the space for a thriving birdlife that also inhabits the area (Bureau, 2012). Other editorialists take issue with the fact that polypropylene is non-biodegradable, or that the use of heavy materials and heavy technology might harm the riverbed.

What is so curious about the terms of this debate, whether it is the politics of embankment construction or the one between weak mud embankments and supposedly stronger concrete embankments is its narrowness. No one seems to be considering a scenario where both human and non-human life can be best protected by doing away with embankments altogether. Instead of weighing mud against concrete, pitting humans against nature, birdlife against people's lives, my challenge to these embankments stems from questions around whether these dividing lines will genuinely aid in protecting the lives and lands of the people for whom they are ostensibly being built.

Other histories

In offering the provocation of Sundarbans embankments as imposed lines rather than lifelines, I take inspiration from the groundbreaking, or, more appropriately, overflowing work, of Anuradha Mathur and Dilip da Cunha (da Cunha, 2018; Mathur and da Cunha, 2016; Mathur and da Cunha, 2001). These scholars and landscape architects have argued that rivers on maps are false lines, created by the act of freezing the frame of the hydraulic cycle and ignoring the myriad other possibilities of thinking about water, such as air, moisture, and monsoons. Da Cunha's writings resonate for the Sundarbans, where boundaries are fluid and the forest is a river. Describing the flooding of the Mississippi River in the USA, Mathur and de Cunha (2001) argue that these cannot be considered natural disasters, but are disasters by design. Perhaps the Mississippi's former Native American inhabitants hold some lessons for the Sundarbans in that 'their habitation was not necessarily on riverbanks exposed to the flows and floods of an entity limited by a line; it was rather in an open field of wetness that rose and fell' (da Cunha, 2018: 2). Monsoon waters in the Sundarbans, like the mighty Mississippi, defy containment.

The possibilities of an unembanked Sundarbans are grounded in a past and a future imaginary where embankments were not considered indispensable to life in the region. Sources during the colonial period described the Sundarbans as extremely fertile, with a flourishing rice crop. Rainey (1891: 271) stated 'the Sundarbans contains the finest rice-fields, not only in Bengal, but in the whole of India.' He wrote that rice flourished in the Sundarbans compared with any other part of British India because it did not depend on the rainfall as much. Crucially, Rainey's account emphasised buffalo and wild boar, not salt water, as the main threats to the ripening rice. Embankments are nowhere to be seen. This destabilises the narrative that agriculture in the Sundarbans cannot flourish without embankments.

Another alternative historical antecedent lies in the several salt-resistant varieties of rice known to have flourished in the Sundarbans. These salt-resistant varieties were destroyed precisely because of the construction of embankments, which led to increasing reliance on freshwater agriculture. Some NGOs such as the Society of Environment and Development are trying to bring back these varieties to the region. In neighboring Bangladesh 'climate change reductionism' – the idea that any kind of flooding must be caused by climate change and the subsequent need to prevent all forms of flooding is hugely problematic. Camelia Dewan (forthcoming) shows us that there are three different kinds of floods - *borsha* (annual monsoon rains), *bonna* (irregular destructive floods in the wake of cyclones and storms) and *jalabaddho* (waterlogging). Each of these has a separate role to play in the local ecology and Dewan

argues that the narrative that all floods are destructive is incorrect. Climate change resilience and programs to prevent floods in the Indian and Bangladesh Sundarbans need to delve deeper into ecological and agricultural histories so as to understand the different conditions in which the landscape has thrived and can continue to do so in the future.

Historical records for the region are few but the archeological evidence of ruins, brick homes, tanks and religious buildings establish the fact the there were flourishing settlements and kingdoms before the colonial period. There is no evidence to suggest that they depended on embankments rather than floodplains. It might have been the case that houses were constructed differently, possibly on higher ground and further inland. Ralph Fitch, a European traveler, who journeyed through this area in 1586 described the region as fertile and with houses that were firm and lofty, doubtless to withstand cyclones and storm-waves (Fitch as cited in Rainey, 1891: 279). Perhaps what he implied by the use of the word 'lofty' is that they were built on stilts, as is the case in neighbouring Myanmar, a region with which there was much more movement of people and commodities than can be conceived of today. Besides the fabulously rich account of the spread of Islam through agriculture in the region documented by Eaton (1993), written evidence of how settlements were built in the pre-colonial period is thin. It is also true that there are several differences that need to be taken into account from what existed a few centuries ago to the current times. These include geological shifts in the delta tilting eastward and several anthropogenic changes. But perhaps, what we need along with a little more information for inspiration toward more attuned designs is in fact a lot more imagination.

Unembanking imaginations

In this essay I have tried to show what can be gained by tethering design to participant observation, a long-term commitment to learn and understand peoples' imaginations, politics, and expectations (Ingold, 2015), which reveals the minutiae of inequality, the geographies of poverty and those that are rendered on the wrong side of embankments. I also take seriously the call by da Cunha and Mathur (2001) and da Cunha (2018) to imagine different possibilities. In doing so, this paper wonders, and asks in wonderment, if it is possible to think of embankments not as lifelines but as mere lines. Perhaps not all that mere, as they do the vicious work of creating false separations between salt and sweet, land and water, forest and river in a delta which refuses such puny dissections and distinctions. But perhaps first, we need to unembank our imaginations, decolonise them from certain histories and re-navigate through other pasts and presents and, while doing so, be cognizant of the thought-worlds, lived realities and material conditions of those for whom designs are proposed. What could be a politics of life better attuned to that which brings rain? Maybe it is thinking in and through storms, acknowledging that the sublime is always a combination of pain and pleasure, ceding to the passions of rivers, rain and their accompanying vortexes, and celebrating, instead of constraining the more mundane ebbs and flows of life. If an ontology of the monsoon is always and only both life threatening and life giving, perhaps we must not forget to remember the answer to the shattering question of who benefits, who hurts, and which lives, human and non-human, suffer from certain kinds of vitality. This may lead to an alternative future of design but also, and as crucially, a more imaginative anthropology inspired by design thinking. Ultimately, this essay is an attempt to coalesce the speculative with the empirical, to have our head in the clouds while also knowing the ground upon which the rain drops fall.

NOTES

01 A *malhar* accompaniment to this essay (Gaud Malhar by Mallikarjun Mansur) is available at: https://www.parrikar.org/music/malhar/mansur_gaudm.mp3

REFERENCES

Bera, S. (2012). 'Fancy Wall for Sundarbans.' *Downtoearth*, 07 June. Available at: https://www.downtoearth.org.in/coverage/fancy-wall-for-sundarbans-38166.

Bureau, O. (2012). 'Concrete Embankments Along Sunderbans an Ecological Disaster | OTV.' *Zee News*, 25 December. Available at: http://zeenews.india.com/news/eco-news/concrete-embankments-along-sunderbans-an-ecological-disaster_818809.html.

Burke, E. (1998). *A Philosophical Enquiry into the Origins of the Sublime and Beautiful*. New York: Penguin Classics.

da Cunha, D. (2018). *The Invention of Rivers: Alexander's Eye and Ganga's Descent*. Philadephia, PA.: Penn Press.

Dewan, C. (forthcoming). *Embanking the Sundarbans: The Obfuscating Discourse of Climate Change in The Anthroposcene of Weather and Climate: Ethnographic Contributions to the Climate Change Debate*. P. Sillitoe. (ed.). Oxford: Berghahn.

Eaton, R. M. (1996). *The Rise of Islam and the Bengal Frontier, 1204-1760*. Berkeley, CA.: University of California Press.

Hunter, W. W. (1973). *A Statistical Account of Bengal: Districts of the 24 Parganas and Sundarbans, 1875-77*. London: Trubner & Co.

Ingold, T. (2015). 'Design Anthropology Is Not, and Cannot Be, Ethnography.' Paper presented at the Research Network for Design Anthropology Seminar 2: Interventionist Speculation, School of Design, Copenhagen, August 2014, Available at: https://kadk.dk/en/centerda.

Jalais, A. (2014). *Forest of Tigers*. London: Routledge.

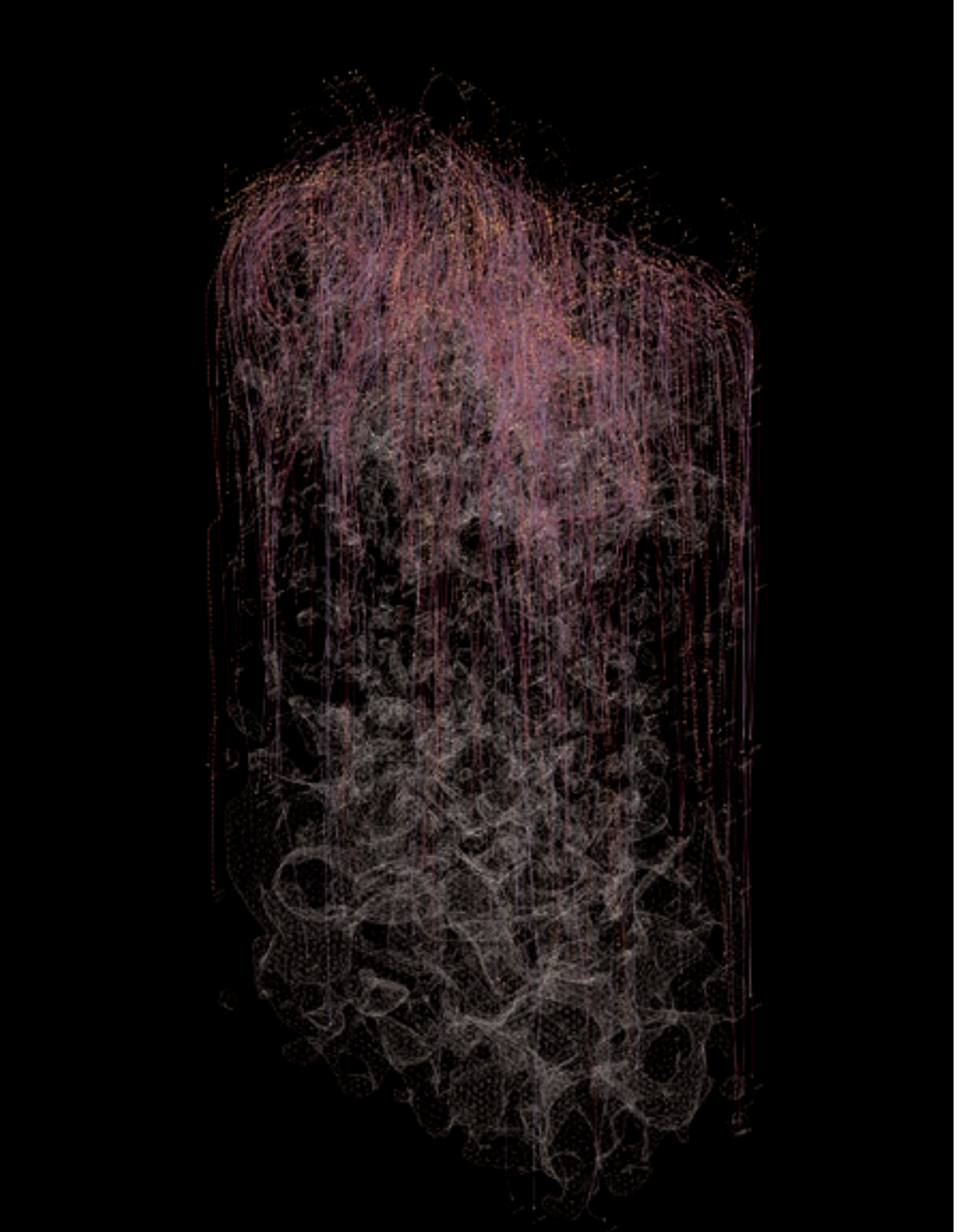
Kant, I. (1987). *Critique of Judgment*. Trans. Werner S. Pluhar. Indianapolis, IN.: Hackett Publishing Co.

Mathur, A. and da Cunha, D. (2016). 'Aqueous Terrain.' *Journal of Architectural Education* 70(1): 35-37.

Mathur, A. and da Cunha, D. (2001). *Mississippi Floods*. Yale, CT.: Yale University Press.

Mukhopadhyay, A. (2015). *Living with Disasters: Communities and Development in the Indian Sundarbans*. Cambridge: Cambridge University Press.

Rainey, J. (1891). 'The Sundarban: Its Physical Features and Ruins.' *Proceedings of the Royal Geographical Society and Monthly Record of Geography* 13(5): 273-287.



MONSOONAL IMAGINARIES

Lindsay Bremner is PI of Monsoon Assemblages and co-tutor of Design Studio 18, with Roberto Bottazzi (2013-2018) and John Cook and Ben Pollock (2018-2019).

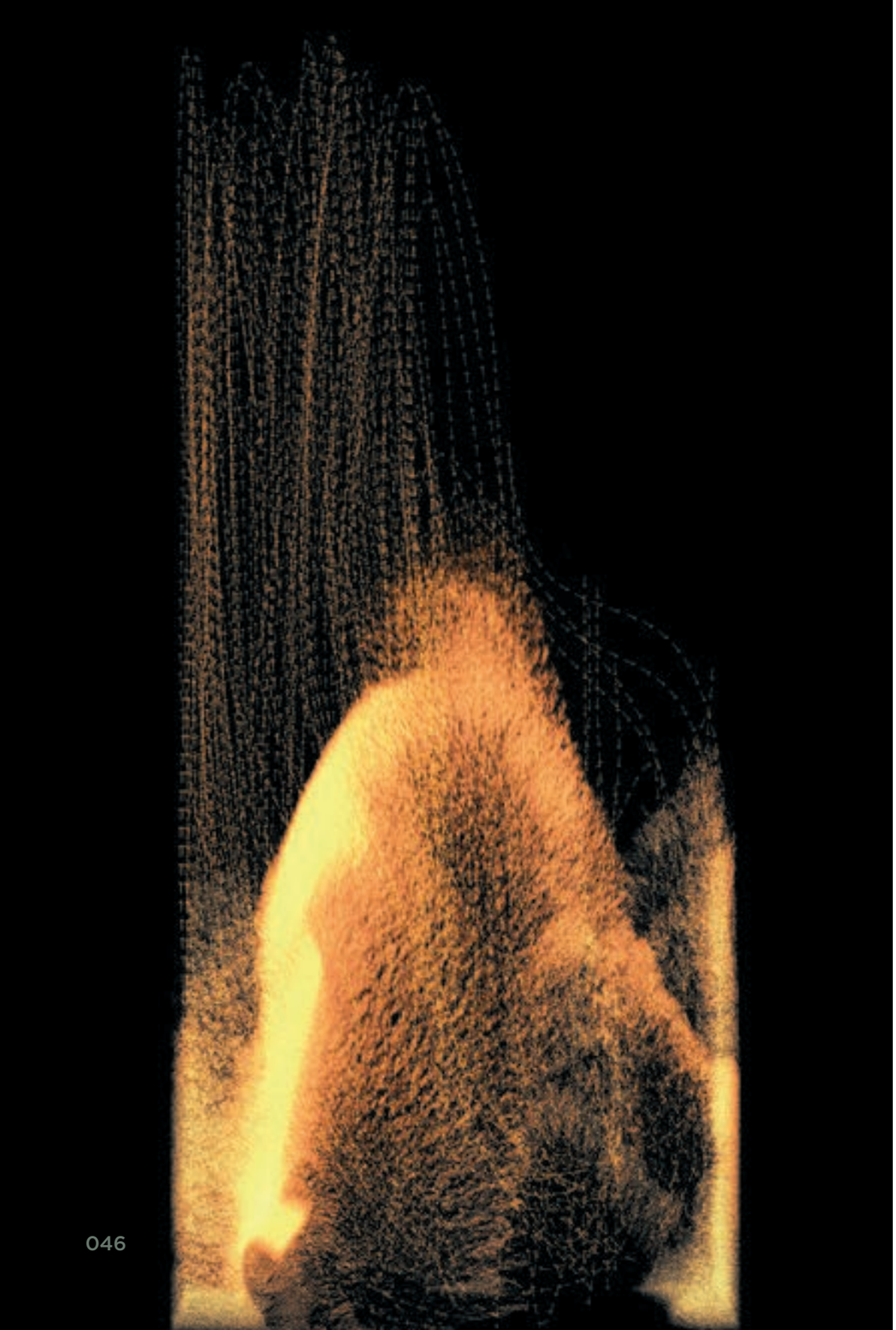
One of the objectives of the Monsoon Assemblages project is to develop new ways of depicting monsoonal sites, territories and phenomena at and across multiple scales as a way of awakening a monsoonal imaginary. Here I use the word depiction intentionally. A depiction is a representation, using words, images or some other medium. But it is more than a representation. It is sets up relations between itself, its audience and what it depicts. A depiction is a transitive verb. To depict is to use a medium of representation to operate on the world, not merely represent it. A depiction is an action that makes new understandings possible.

With this in mind, students in Design Studio 18, the studio at the University of Westminster aligned with Monsoon Assemblages for the past three years have been experimenting with how to depict monsoonal phenomena using computational tools. During the studio in Chennai, students simulated monsoon rain, in Bangladesh they worked with the fluidity of the delta and in Myanmar, they explored the Ayeyarwaddy River at multiple scales, from the geologic to the microbial. The objective of these experiments has not been to accurately model monsoonal phenomena in a quasi scientific way, nor to arrive at truths about how the monsoon behaves, but rather to reimagine architecture as space, time, matter, weather and energy. Simulations have served as experiments for positioning architecture within dynamic monsoonal systems, for depicting their spatial and temporal qualities and for developing a monsoonal imaginary.

To do this we have used time based fluid dynamic software, which is not organised typologically or geometrically. Next Technologies package RealFlow has played a central role in these investigations. It has allowed students to simulate geological, meteorological and other physical phenomena, and, using their intuitions, to isolate, foreground, intervene in and depict certain processes. Roberto Bottazzi (2016), former tutor of Design Studio 18 describes the procedure in this way:

> *RealFlow asks the operator to design the initial scene by populating it with forces, frictions, materials properties, and behaviours which are eventually set into motion to interact with one another. This undoes hierarchies of matter to reduce them from pre-established geom-etries to particles, or voxels, endowed of physical properties. Not only*

P044 Simulation of water percolation. Constantina Avraamides, 2018. Software: RealFlow, Grasshopper.



is this type of spatial organisation much closer to scientific theories such as chaos and emergence, but it also forces the designer to model how simple forms of material organisation can be cultivated, aggregated and combined (Bottazzi, 2016: 20).

(Figs.01-03) on the following pages illustrate this process. They describe Sarah Bass's experiment in 2018 to model sediment dynamics on a river bed in Bangladesh. They show how she set up her experiment (Fig.01), lay out a series of frames from her RealFlow simulation (Fig.02), and then foreground a single frame as a powerful aesthetic interpretation of these processes. This depiction, while having no claims to accuracy in relation to the real world, is produced through rigourous adherance to the set of computational rules she established and projects a powerful image of riverine dynamics (Fig.03).

Work by other students is scattered through this publication on P044, 046, 088-089, 183 and 222

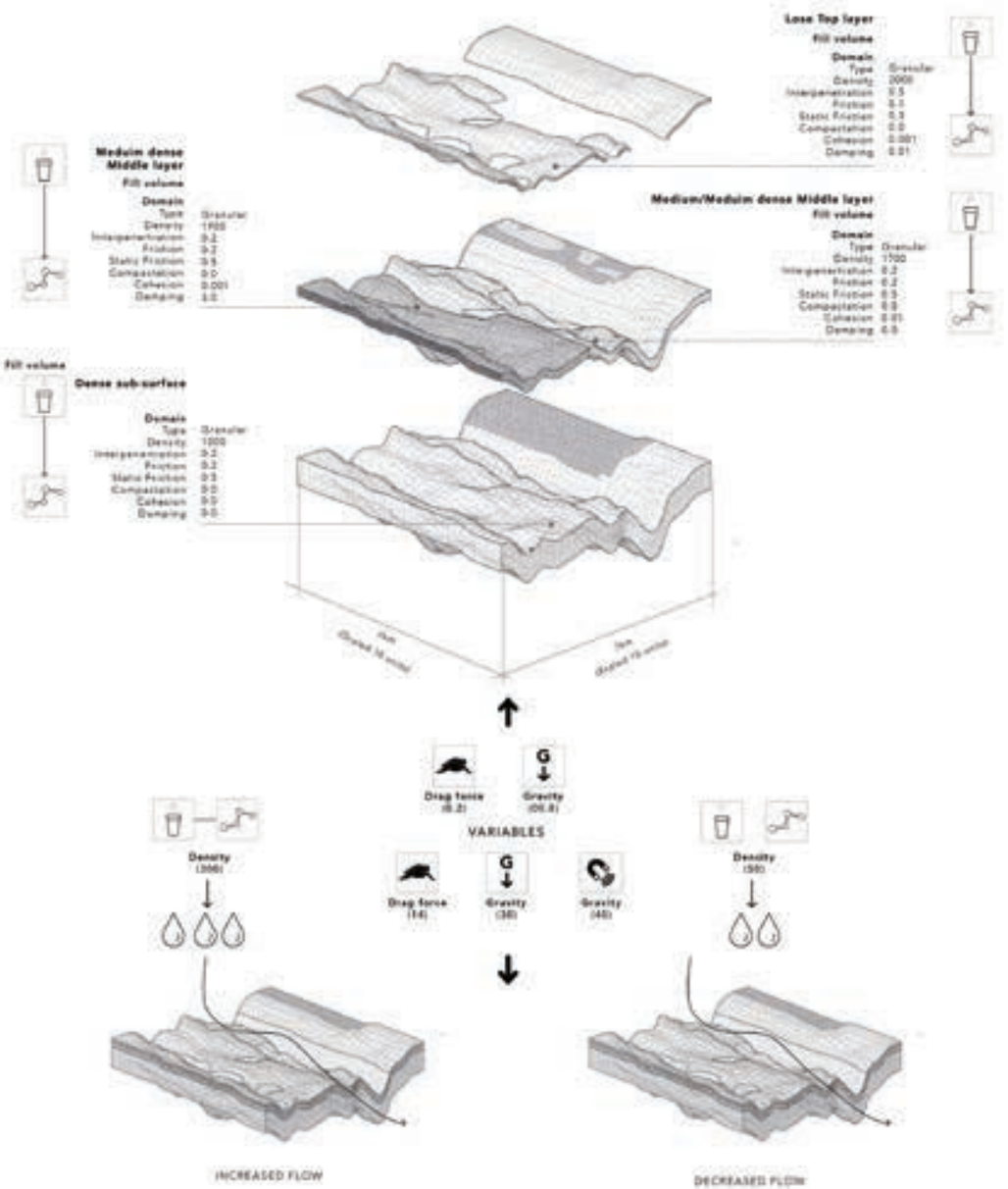
REFERENCE

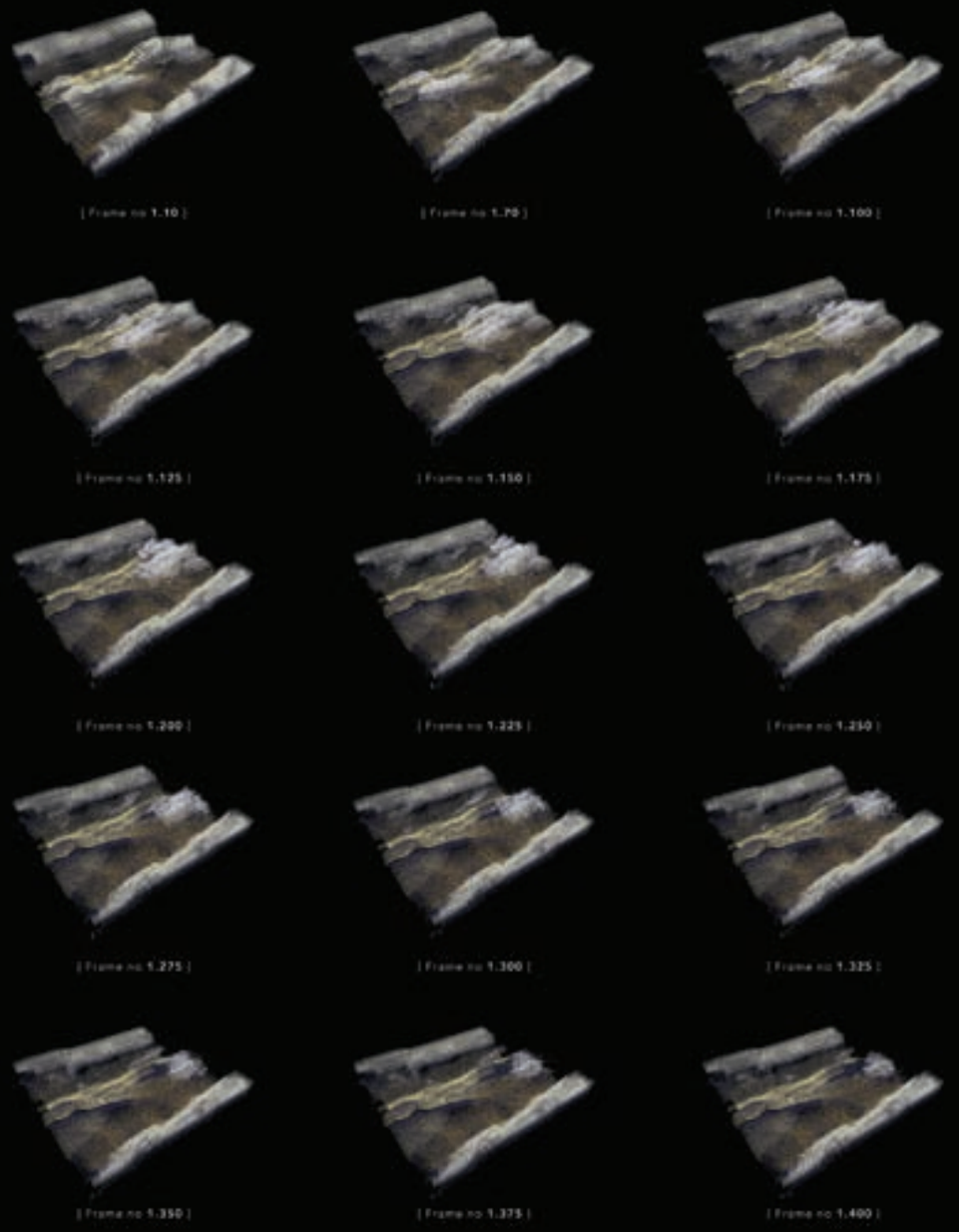
Bottazzi, R. (2016). 'On Computer Simulations in the Age of Hyperobjects.' In: L. Bremner and R. Bottazzi (eds.), *Architecture, Energy, Matter,* 16-22. London: Department of Architecture.

P046 Simulation of turbulance caused by sand mining. Charlotte Birch, 2018. Software: RealFlow, Grasshopper.
P048-051 Figs.01-03 Simulation of sediment dynamics on a river bed. Sarah Bass, 2018. Software: RealFlow.

TOPOGRAPHICAL SURFACE OF RIVER BED

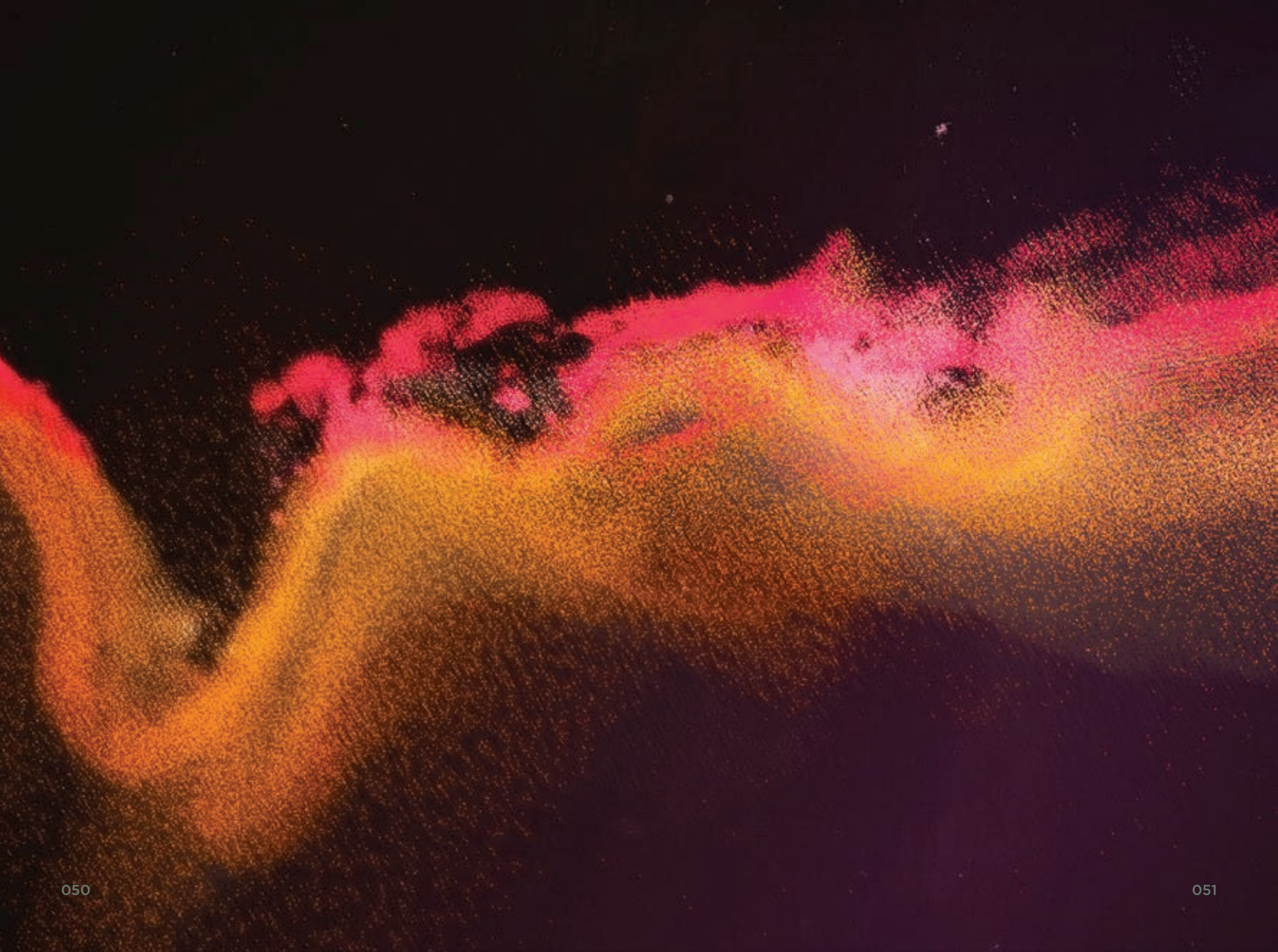
Fixed parameters





[INCREASED FLOW]

The simulation represents the greater volume of water that river receives during the monsoon season. As a result the force on the sediment that exists within the river bed is greater, causing them to shift.



WATERY PRACTICES

WAYS OF SEEING WATER

Pamila Gupta is Associate Professor at the Wits Institute for Social and Economic Research at the University of Witwatersrand in Johannesburg, South Africa. She holds a PhD in socio-cultural anthropology from Columbia University. Her work explores Lusophone (post)colonial links and legacies in India and Africa. She is widely published and is the author of two monographs: *The Relic State: St Francis Xavier and the Politics of Ritual in Portuguese India* (Manchester University Press, 2014) and *Portuguese Decolonisation in the Indian Ocean World: History and Ethnography* (Bloomsbury Academic, 2019).

Prelude

It is early April 2018 and I have come to London to speak about water from the Cape in South Africa where I have spent the last six weeks experiencing what it means to live in a city that is running out of water, where its taps could run dry. I am one of the more fortunate ones, both because I am staying in Stellenbosch which is not as bad off as neighboring Cape Town (with a population of 4 million inhabitants) and because I am only there for a short period of time, my permanent residence being Johannesburg. There are daily reminders of a looming Day Zero which is perpetually postponed; it was first set for April 2018, then August 2018, and now it has pushed its clock to 2019, perhaps because Cape residents did take heed, for now anyways. Strict water measures include leaving swimming pools dry, not watering lawns or plants, taking five minute showers, and availing of hand sanitizer in public bathrooms to replace running water. In Stellenbosch, I see a clever ad campaign in English and Afrikaans around town to appeal to its residents to take care of the world's most precious commodity that is water. Perhaps the crisis has been averted, I am not sure (Chutel, 2018). I will be back in Johannesburg at the end of April, but then they say my home city is not so far behind Cape Town.

Introduction

In his influential BBC series and landmark text on art criticism, *Ways of Seeing* (1972), the late John Berger suggests that the way we see things is determined by what we know, and that this relationship is never settled. In this presentation, I take up his point to explore creative ways of seeing (and thus reading, viewing, interpreting, and writing about) the monsoon. This paper is a curatorial experiment; it provides a way of thinking through monsoon matters (and specifically its wetness) by way of its visual attunements.

This paper extends a set of earlier arguments I made in an article entitled 'Monsoon Fever.' In 2012, I wrote:

> *Thus, it is possible to conceptualize the monsoons as part of an Indian Ocean network following Latour (2005) that creates rhythms and patterns - that is, as having a role in creating a fundamental sense of oceanic being and place - but also as a space of future disjunctures (of creating a sense of non-place) in relation to a dramatically changing physical ocean... Precisely because of its defining character - it connects water and sky, and links geography (specifically climate and climate change) with politics and development - it allows us to engage with the 'oceanic' more seriously. In addition, the monsoon offers a point for reflection on connectivity—that is on how people, things, and ideas travel in a changing Indian Ocean world* (Gupta, 2012: 517).

It is this latter point, of the connectivity of people and things in a monsoonal world that I want to explore here six years later; yet I also move my discussion in another direction, focusing more narrowly on its visual and affective rhythms and patterns, experiences and memories.

In this short reflective essay, I take up two representations (or registers) of monsoonal wetness. I first turn to a photographic series by Ritesh Uttamchandani entitled 'Facing the Monsoon' (2014) to access its visual and experiential components, as a 'lived environment' following Marcus Taylor (2014) and seasonal infrastructure. Next I look at the affective by way of a lone image by photographer Arko Datto that I came across whilst researching this paper that arrested my gaze to think about the already lost monsoonal. This paper is at another level, an exercise in revisiting one's earlier work but from another perspective of time and space when 'climate co-production,' again following Taylor (2014) feels more palpable in the era of the anthropocene. It is once again a way of seeing differently, following Berger. Perhaps my experiment with 'seeing' could be likened to what Stefan Helmreich (2015: xi) calls 'sounding' - a form of investigation, fathoming, listening - to describe the form of inquiry appropriate for tracking meanings and practices of the biological, aquatic, and sonic in a time of global change and climate crisis.

Visualising water

On 26 July 2005 the rain gods attacked Mumbai with relentless intensity. Nearly thirty inches of monsoon rain lashed the city within a twenty-four-hour period. Water flooded many neighborhoods

Mumbai, 2013. Juan Orrantia

and clogged the city's drains, roadways, and suburban rail network. Transportation came to a standstill, flights were cancelled, the stock exchange close, schools and colleges shut down, and people waded or swam to safety. The flood evoked a primeval image. The idea of a city under water is the stuff of myths. It was nature biting back, punishing humans, its fury leveling their prized creation - the city. Just a few months earlier, the business and political elites had been retailing dreams of turning Mumbai into a world class city, of transforming it into another Shanghai. But those dreams literally went down the clogged drains. People recalled the experience with a shudder. Monsoon waterlogging was commonplace, but this was a frighteningly different sight - this was the city itself sinking, inch by inch. It produced a sense of being choked and trapped. Many described having walked for hours through

water, negotiating past floating garbage, debris, and animal carcasses to reach their homes, only to find them inaccessible or inundated. Phones went dead and the mobile networks were jammed. Mumbai appeared imperiled. It was an urban dystopia - not a dream city, but a nightmare (Prakash, 2008: 181-182 quoted in Gupta, 2012: 516-517).

I opened 'Monsoon Fever' (Gupta, 2012) with this dystopic image from Gyan Prakash's chapter entitled 'Mumbai: the Modern City in Ruins' written in 2008 in order to emphasize the monsoon as a grand 'spectacle of turbulence' (Kaplan, 2010: xiv). It is now more than ten years since that catastrophic event in 2005 and I want to put his passage (on India) to a different use: to suggest its use as a backdrop for looking at Ritesh Uttamchandani's more benign Facing the Monsoon photographic series, which consists of forty-nine images created on June 13, 2014 in the Andheri suburb of Mumbai, near its metro stop. There are colorful photographs of people persevering, umbrellas rendered useless by the rain and winds, of wet pants, shirts, and salwar kameezes clinging to equally wet bodies. In this series, there is a plot of man conquering nature (or maybe not?), the monsoon a character in itself; it is a form of infrastructure and an assemblage. There is a showcasing of elaborate styles of umbrellas. I see polka dot umbrellas, bow tie designs, flowers, prints, and bright colours. Crowds of people create an umbrella of umbrellas as they wade through the muddy waters of urban Mumbai. I glimpse hands holding hands, offers of support, especially amongst the women. I ponder a brisk business in rain gear behind the scenes - umbrellas, rain boots, and raincoats. I see smiles and grimaces in the face of adversity, moments of intimacy between owners and their things as a woman wades through the water choked roads wearing earphones, her phone hidden from sight but a faint smile on her face, her thoughts likely focused elsewhere. Her umbrella is one of many amidst a sea of umbrellas fighting the earth's elements. One man pulls up his already rolled up pants, another carries a massive plastic covered box supported on his head. Daily life continues, despite the rains which are seen as part of the ritual of the monsoons.

On the one hand, I want to suggest that Uttamchandani's photo series shows the work-a-day quality of the monsoons, suggesting that it is a sort of seasonal habitus for people on the South Asian continent who readily prepare themselves every year between the months of June and August for their arrival and departure. It is they who are reliant on them, expecting and living with these seasonal rains (and that bring a range of emotions, frustration, joy, humour, discomfort, etc.) that bring so much more than just water on an annual basis. One the other hand, his series perfectly represents 'the twin conditions of volatility and vulnerability' that Lindsay Bremner (2017) argues are 'presented by and through climate change, globalisation, and rapid urbanisation across the Indian subcontinent.' Thus, Uttamchandani's photographs can also be read as visually documenting the 'slow violence' (Nixon, 2008) that we live with every day, with humans forcibly pitted against nature. They serve as a cautionary reminder that next year's monsoon could easily return us to that fateful day of July 26, 2005 that Gyan Prakash captured in his account, lest we forget the likelihood of its 'catastrophic suddenness' (Ghosh, 2016: 60-61) to return.

John Berger (1972: 10) writes that 'images were first made to conjure up the appearances of something that was absent.' Perhaps future generations of Mumbaiites will look at these images by Uttamchandani and think if only we had taken care, or wonder if the monsoons will ever return (with such little or full force, for it could go either way) so that

Mumbai, 2013. Juan Orrantia

they can share in the experiences of their ancestors of walking through water on the streets of their home city.

Visualising wetness

For let us make no mistake: the climate crisis is also a crisis of culture, and thus of the imagination
(Ghosh, 2016: 12).

In the second section of my paper, I turn to a lone image taken by Indian photographer Arko Datto. I came across this particular photo by chance, and am unable to find a date attached to the image. It stands as a quintessential timeless other, both online and in my own mind. I have chosen to dwell inside of it to think about the affective, and how certain images compel us to think or see differently following Berger (1972) once again. It is monsoonal wetness that this photograph accesses for me, almost as a past moment that I am hopeful and nostalgic for, and that I realize will most likely no longer exist in some future tense. It is a sublime image, not only in its watery hues, and folder and layers of cloth and skin in contact with water, but also its tangible quality that makes me want to feel it, the act of looking another way of touching, following Chris Pinney (2003). At one level, it can be read as celebrating the sacredness of water. It is a romantic and romanticized version of the monsoon as much as it is of rural India itself, reinforcing the time-old image of village Indians as more in tune with and appreciative of the monsoons, and as a form of livelihood upon which they very much depend more so than the urban dwellers battling the monsoon showcased in Ritesh Uttamchandani's photo series. I see pinks, purples, faded greens and blues that fade into a hazy background of never-ending water. I gaze upon seven people gazing in multiple directions, with different kinds of looking taking place inside the frame of the photograph itself. I see a gendered India, the six women and one man are all looking down or away from the camera, one averts her gaze, another has her back to us. The image suggests an intimate and private moment (of bathing) caught unaware by the photographer.

In his book *Camera Lucida*, Roland Barthes (1980) develops the idea of 'punctum' - the point to which the eye is drawn when looking at a photograph that goes beyond seeing by way of acculturation or familiar knowing. He writes: 'the punctum, then is a kind of subtle beyond - as if the image launched desire beyond what it permits us to see' (Barthes, 1980: 59). It denotes the wounding, personally touching detail that establishes a direct relationship with the object or person photographed. Punctum is what makes me single out this photograph and focus on this group of unbeknownst bathers captured by Datto on film both for what it says and does not, its present absences. I want to offer up the point that punctum can potentially offer a way to read and make meaning of the monsoonal through the personal, the poetic, or as a form of affect.

It is also important to remember, following Kylie Thomas, that 'how one reads is through other images, visible or remembered, alongside and in conjunction with the single image that can never be singular' (2010: 426). In other words, my reading of Datto's photo of monsoon wetness cannot escape other images reverberating in my head of impending monsoonal loss.

Here I return full circle to John Berger whose ideas on photography prompted this curatorial experiment in ways of seeing water. Can we think more creatively then about the history of monsoon experiences and images that capture them in their pastness as we portend a climate crisis and extreme weather conditions such as 'flash floods, hundred year storms, persistent droughts, spells of unprecedented heat, sudden landslides, raging torrents, pouring down from breached glacial lakes, and yes, freakish tornados,' following Ghosh (2016: 32). Will it be the case that monsoonal wetness will eventually be betrayed and/or replaced with portraits of the earth's cracked dryness; that is, the event of the non-monsoonal will come to bear increasing significance instead. A set of images taken by the same photographer Arko Datto was featured in a BBC news article entitled 'In pictures: the drought India forgot' (BBC News India, 2012) and attests to this reality.

Conclusion

Quite possibly then, this era, which so congratulates itself on its self-awareness, will come to be known as the time of the Great Derangement
(Ghosh, 2016: 15).

I want to end my essay with an image from South African photographer's Gideon Mendel's *Drowning World* series which was on show at the Wits Art Museum in Johannesburg earlier this year and which I saw in February 2018. With this exhibit, Mendel sought to document floods in thirteen countries since 2007, including the UK, India, Haiti, Pakistan, Australia, Thailand, Nigeria, Germany, the Philippines, Brazil, Bangladesh, US and France in order to 'explore the human dimension of climate change by focusing on floods across geographical and cultural boundaries....to evoke our shared vulnerability to global warming, thus questioning our sense of stability in the world' (Mendel, 2018).

The photograph I focus on here is an image of a water damaged family portrait from India taken in the year 2014. I don't know much more about the photograph or the individuals in the photograph, nor is it likely that I will glean any additional information from further looking. On one level, it is an ordinary photograph of an ordinary family, mothers and daughters and fathers and sons all smiling for the camera. Yet, its exaggerated quality of patina due to the floods –such that the image

looks like it has been almost erased with colours bleeding into each other—moves it to another level of representation which speaks volumes; the photograph captures the frailty of the past colliding with the present in the face of an uncertain planetary future. Looking at it makes me mourn the loss of the material image, and wonder what happened to this family after the floods. The photo also points to the impending likelihood that the rains will either arrive in excess or not at all; that is, we will live in a perpetual condition of weather extremes such that family portraits will be left behind hanging on walls.

My reflection concludes with the hope that I have given start to alternative ways of seeing, thinking and understanding the monsoon, and its watery pasts, present and futures. My focus on the visual (and the affective within the visual) can be seen as a form of politics, of staking a claim about climate change by way of the monsoon in relation to its properties of water. On the one hand, I am asking what will happen to the connectivities between humans and nature that we see for example, in Uttamchandani's photo series of urban dwellers battling the seasonal monsoons, or by Arko Dattar's sublime image of Indian villagers luxuriating in monsoonal wetness. On the other hand, my paper can be seen as a form of archival address, an opening up of new ways of documenting the monsoon (past, present and future) by way of the category of experience and the materiality of photographic images.

'Monsoon matters' are all that Bremner (2017) has described in the call for papers of this conference, which, like the monsoon itself, is an annual seasonal event, and leaves scope for much more collective thinking, analysis, and archiving. Yet, the difficulty to think about instituting change persists, for as Amitav Ghosh (2016: 72) aptly points out, 'very few of us will uproot ourselves and make the right preparations to deal with global warming. Instead … for most governments and politicians, as for most of us as individuals, to leave the places that are linked to our memories and attachments, to abandon the homes that have given our lives roots, stability and meaning, is nothing short of unthinkable.'

REFERENCES

Barthes, R. (1980). *Camera Lucida: Reflections on Photography*. Trans. R. Howard. New York: Hill and Wang.

BBC News India (2012). 'In pictures: The drought India forgot.' *BBC*, 17 October. Available at: http://www.bbc.com/news/world-asia-india-19959329.

Berger, J. (1972). *Ways of Seeing*. London: British Broadcasting Corporation and Penguin Books.

Bremner, L. (2017). 'CFP, Monsoon Assemblages [+Other] Waters Symposium.' *Monsoon Assemblages*, 27 October. Available at: http://www.monass.org/call-for-papers-monsoon-waters-symposium/.

Chutel, L. (2018). 'How Cape Town delayed its water shortage disaster, at least until 2019.' *Quartz Africa*, 09 May. Available at: https://qz.com/1272589/how-cape-town-delayed-its-water-disaster-at-least-until-2019/.

Ghosh, A. (2016). *The Great Derangement: Climate Change and the Unthinkable*. Haryana: Penguin Books.

Gupta, P. (2012). 'Monsoon Fever.' *Social Dynamics* 38 (3): 516-527.

Helmreich, S. (2015). *Sounding the Limits of Life. Essays in the Anthropology of Biology and Beyond*. Princeton: Princeton University Press.

Kaplan, R. (2010). *Monsoon: The Indian Ocean and the Future of American Power*. New York: Random House.

Latour, L. (2005). *Reassembling the Social: An Introduction to Actor-Network Theory*. Oxford: Oxford University Press.

Mendel, G. (2018). *Drowning World*. October 18, 2017 - February 28, 2018. Johannesburg: Wits Art Museum.

Nixon, R. (2011). *Slow Violence and the Environmentalism of the Poor*. Cambridge: Harvard University Press.

Pinney, C. (2003). 'Notes from the Surface of the Image: Photography, Postcolonialism and Vernacular Modernism.' In: C. Pinney and N. Peterson (eds.). *Photography's Other Histories*, 202-230. Durham: Duke University Press.

Prakash, G. (2008). 'Mumbai: The Modern City in Ruins.' In: A. Huyssen (ed.). *Other Cities, Other Worlds: Urban Imaginaries in a Globalizing Age*, 181-203. Durham, NC: Duke University Press.

Thomas, K. (2010). 'Zanele Muholi's Intimate Archive: Photography and Post-Apartheid Lesbian Lives.' *Safundi: The Journal of South African and American Studies* 11 (4): 421-436.

Taylor, M. (2014). *The Political Ecology of Climate Change Adaption: Livelihoods, Agrarian Change and the Conflicts of Development*. London: Routledge.

Current and future research by Rising Tides | Changing Lives attempts to understand Bangladesh's present situations and building techniques. Which spatial solutions are succeeding and which are failing? How can relatively primitive building techniques and materials that are native to people and place be instrumental in developing contemporary responses to climate crisis? How can normative notions of development be questioned and innovative, alternative solutions that adapt to changing conditions be speculated on?

RISING TIDES | CHANGING LIVES

Photographic Essay by Nikole Bouchard, whose work focuses on how the intersection between art, architecture and landscape can stimulate ecologically sensitive and culturally relevant design interventions. Nikole is an Assistant Professor in the School of Architecture & Urban Planning at the University of Wisconsin–Milwaukee. She has also taught at Yale University, Cornell University, Syracuse University, the University of Waterloo and the University of Toronto. In 2015 she was a Fellow at The MacDowell Colony in Peterborough, NH and an Artist in Residence at Baer Art Center in Hofsós, Iceland. Nikole holds a MArch II Degree from Princeton University and a BArch Degree from Cornell University.

Each year the Bangladeshi people are in constant battle with natural calamities like cyclones and floods. These annual disasters bring death and destruction to the country, leaving millions of people without homes, food, water and electricity.

Bangladesh has an overall population of 156 million people and the world's highest rural population density with 1,200 people per sq.km. This rural population consists primarily of farmers and fishers, all of whom are dependent upon the world's largest delta to sustain daily life. These waterways are also crucial sources of transportation, irrigation and education.

Each year, between the months of June and October, the monsoons bring an average of 2,500 mm of rain to the world's largest deltaic country. The swelling of rivers and rising sea swallows 25,000 acres annually, leaving upwards of 500,000 people homeless and landless.

Each year during the monsoon, the rivers that are fed from the Himalayas flow south through Bangladesh, depositing abundant amounts of silt and sand from upstream. Many farmers are now attempting to use this sediment to construct barriers that will help protect against floods and the rising sea levels.

The farmers also use these earth constructions to channel incoming silt to be deposited where it is most needed: filling shallow soup bowls and creating land off the coast in an effort to reclaim their lost territory.

In the countryside, Bangladeshi rural dwellers have developed several formal and material techniques in an effort to adapt to their climatic conditions.

Dwellings commonly found in rural areas are called kutcha and pucca. Kutcha homes are typically made of earthen materials like mud brick, bamboo, timber and plant material. The roofs are often hatched with grasses fastened to a bamboo structure. These earthen materials are relatively economical and readily available to local farmers. These simple, natural materials create climate controlled spaces that are cool in the heat and warm in the winter without the use of expensive materials and unavailable technology.

Pucca dwellings are constructed with foreign materials that are considerably more expensive but also more durable. The foundations, walls, and roofs of pucca dwellings are constructed with brick and reinforced concrete. These structures have a longer life span than kutcha dwellings, but the cost and lack of climate control has proven to be a significant problem.

The annual inundation of Bangladesh and the resulting numbers of climate refugees have proven to put a major strain on Bangladesh's cities like the capital, Dhaka. Unpredictable population influxes result in rapid, unplanned urbanisation.

Most climate refugees obtain their basic needs by living in informal settlements. Impromptu tent towns pop up overnight, infiltrating any spare space in sight. These cities, constructed of materials like recycled plastic sheets and discarded bamboo, are typically erected on or near private land, markets, railroad tracks and river beds. During the dry season, most dried-up riverbeds become grounds for illegal inhabitants.

Nearly 7,600 households live in 44 slums within 50 meters of a river in Dhaka. This process and the pollution that accompanies this aggravated urbanisation is a vicious cycle that chokes the city's waterways, thus worsening the floods with each year that passes.

Dhaka is surrounded on four sides by rivers, the Buriganga to the south, the Turag to the north and west and the Balu to the east. These waterways are crucial for providing daily basic needs like transportation, drinking water, bathing oppotunities and food supplies for the population.

Major contributors to Dhaka's industrial pollution are the 200 tanneries that line the city's waterways. These factories produce up to 40,000 tons of toxic tannery waste daily, most of which finds its way into the Buriganga River. One of the most contaminated sites in the city is Hazaribagh, shown here.

RHYNE & HUISH

Laura Denning is a UK artist working nationally and internationally, through commissions, residencies and installations. She is currently a practice-based research student in environmental humanities at Bath Spa University. Her practice is informed by initial training as a painter. Current methods include experimental geography which involves participatory and collaborative practice to create new work.

Introduction

For the second Monsoon Assembly at the University of Westminster in April 2018, Monsoon [+ Other] Waters organised by the Monsoon Assemblages team, I presented a short film which formed a punctuation in an ongoing project entitled '*Rhyne* & *Huish*.' This developing body of trans-disciplinary work explores water using the Somerset Levels and the Avalon Marshes as its locational foci. A *rhyne* (pronounced reen) is a ditch or canal used to transform areas of wetland into pasture. *Huish* is a habitational name that may refer to small areas of land and woodland large enough to sustain a family. The short artistic film that I introduced at the Monsoon Assembly, entitled 'Fog', employed oblique creative languages (as opposed to a documentary approach) to propose that climate change is impacting upon the landscape of the Somerset Levels and the Avalon Marshes irrevocably, and that wetness as a way of being provides a starting point for renegotiating life in such a changing landscape. The intention was to consider water as vapour, beyond liquidity, as a significant aspect of wetlands ecosystems, and as a sensuous yet disorienting phenomenon.

The Somerset Levels are subject to severe flooding, both from internal waterways and from coastal flooding. They are unique in the UK for this reason, being, essentially a delta which barely rises above sea-level. During December 2013 and January 2014 heavy rainfall led to extensive flooding of over 600 houses and 17,000 acres (6,900 ha) of agricultural land. The village of Thorney was abandoned and Muchelney cut off. Through the winter months the Somerset Levels are often shrouded in thick fog and mist. Fog is low-lying, the moisture being generated locally. From a scientific perspective, the only difference between mist and fog is visibility. However, a recent experience watching the mist rise off a river as dawn arrived, and of this mist flowing like a spectral memory of the river itself, leads me to question such a prosaic distinction (Fig.01).

Hawkins' (2013: 12) view that artistic experiment 'has the potential to transform the field on which it is working,' pushing beyond

normative conceptions of geography to provide us with 'possibilities… for experiencing and thinking the world differently' is central to this research. Throughout the '*Rhyne & Huish*' cycle (intended as a 12 month project running from December 2017 to December 2018), I continue to experiment with creative methodologies that aim to push at the percieved boundaries of geographic practices. The screening of 'Fog' was one small intervention that precipitated other forms of intervention, all of which are contributing to extend the scope of my doctoral research beyond that which was considered at the start. The PhD is entitled 'Developing a Hydrofeminist Art Practice – bodies, spaces, practices' and seeks to critically develop creative languages/practices which might successfully embody the feminist subject-as-process as a critical testimony, and to ask of those embodiments how they can impact upon our capacity to address the political bias that defines the climate change narrative. 'Hydrofeminism' is a term coined by Astrida Neimanis (2012: 86) who asks 'what might becoming a body of water - ebbing, fluvial, dripping, coursing, traversing time and space, pooling as both matter and meaning - give to feminism, its theories and its practices?' I seek to answer this, through art practice, whilst also asking in what ways hydrofeminism could impact upon environmental thinking, particularly through the lens of ecofeminism? Hydrofeminism continues feminism's and ecofeminism's questioning of what is natural, and pays attention to historic and current human/nature relationships in differing eco-social settings. It is apposite and urgent, given that aspects of the current environmental crisis are water based in their manifestations: for example climate change, drought, flooding, water borne pollution, contestation over water rights and access, transnational river and catchment management and contestation, water and gender issues etc.

'*Rhyne & Huis*h' operates as an archive of sorts. I am using field notes as a series of test spaces for developing material for an 'archive of meaning and matter' (Neimanis 2012: 98), in which water is the archive. Neimanis makes the connection between physical flows and constant (re)cycles (heavy with human excess, from pharmaceuticals to throw-away plastics) and the cultural meanings which are embedded in these materialities, citing water as an archive for these pluralities.

However, mine is a forward-looking archive, a set of present moments from which to begin to negotiate a future. This film in the '*Rhyne & Huish* cycle,' simply titled 'Fog', whilst only five minutes long, is a form of slow art, with a focus upon the landscape simply being. In the editing of the work there are a series of strangeing strategies employed that seek to exaggerate intimacy and sensuousness. These use disruption as a method of embodiment. There are contradictions between image and sound and an absence of visual representations of water entirely, because the fog occupies the territory. There are points where sound drops out entirely as the film holds its breath either through fear, anticipation or

Fig.01. Somerset Rhyne in Dawn Fog. Laura Denning, 2018.

submersion (something 'left over', for the viewer to decide), plus the inclusion of a robotically presented poem (Carl Sandburg, 1916), which tells of fog in another environment entirely. This disembodied spoken word interjection into the soundtrack hints at the disjunction between policy makers and people on the ground, or in the water. The machine-generated voice, accessed through online systems, including GPS, acts as a metaphor for distance and dissonance, for systems operating without subjective interference, not dependent upon actual human experience or testimony. Elsewhere in the film, my own voice presents, amongst other things, the beginnings of a glossary of landscape types, a provisional provenance to include in my archive of watery meanings and matters (Fig.02).

This year long project started with an accumulation of information, mostly regarding climate, topography and other geographical data pertaining to the Somerset Levels. These have been collated into a small reference book, the pages of which were exhibited in February 2018. I then made a filmic sketch - a very short silent film which doesn't have a name, but which added another dimension to my hoard of references, which also includes about 500 photographs to date. A forty five minute sound walk was presented at the Seeing Sound conference at BathSpa

Fig.02. Rhyne, Avalon Marshes. Laura Denning, 2018.

University in late March 2018, and is now available on Sound Cloud (https://soundcloud.com/user-340930442/rhyne-huish), and a sixty second excerpt from this was played on a loop throughout Fringe Arts Bath in May/June 2018. This film is the halfway point in the 'Fog' section of the extended project, and again the soundtrack draws upon the full length sound walk. I will return to working with fog once the Somerset Levels are again shrouded in mystery, in the autumn and winter of 2018.

This short film is situated within my practice as a field note and as a contribution to an 'archive of meaning and matter.' Wikipedia (2017) tells us that 'field notes refer to qualitative notes recorded by researchers in the course of field research. The notes are intended as evidence that gives meaning and aids in the understanding of the phenomenon. Field notes are subject to (a) memory and (b) possibly, the conscious or unconscious bias of the observer. Descriptive information is factual data that includes time and date, the state of the physical setting, social environment, descriptions of the subjects being studied and their roles in the setting. Reflective information is the observer's reflections about the observation being conducted.' Field notes capture immediate data specific to a time and place, and are positioned as provisional and indicative within bigger research projects. They form the initial basis of ongoing enquiry, then later resurface within appendices. They are foundational yet also marginal. Field notes identify and anchor key trajectories within research, they sketch out a general direction and highlight potential areas where key findings might later be located. Field notes also have an integrity in their own right precisely because they are subject to memory and subconscious bias. The short film presented at Monsoon [+ other] Waters presented appendices not as a collection of supplementary materials, but as the material itself, marked by the presence of the observer whose recording strategy is arbitrary, uneven and embodied.

The overall research for my PhD draws on a range of approaches but key references which provided a starting point included Doreen Massey and Rosi Braidotti. Massey, for example in her book For Space (2005) argues that what makes a particular view of social relations specifically spatial is their simultaneity. In another view of spatiality, Rosi Braidotti (1994) insists that we provide more adequate accounts of our location. These two views have informed the creative research which foregrounds an embodied and located practice. The disciplines that this research integrates include cultural geography and creative art practice. The practice-led basis for the research is site-specific – or better still, site-responsive. It began with an assumption that work would develop out of qualitative ethnographic data (informed by Crang and Cook, 2007), gathering material such as interviews and participant observation, but has infact developed emergent methods best described as experimental geography.

Walking itself marked the next phase of the project, with an ethnohydro walkshop taking place in May 2018. This involved bringing together artists, ecologists and scientists for a days' perambulation across the Avalon Marshes, sharing conversation around key words. These conversations were recorded, openly but subtly, and the recordings will form the basis of a set of sonic rhynes – scores for a performative work, which is currently being developed. The overarching intentions (some key words) - hydro, archive, wetness - were explored on this walk using the combined methodologies of walking, collaborating, and data collection through sound and image, all leading towards the collation of a chapter in the afore-mentioned 'archive of meaning and matter'. Other walks are scheduled throughout 2019 including 'Deep Time, Shallow Water,' in which participants will explore land below sea level deep in the land-locked Somerset countryside, collecting submersive testimonies, walking as if … ankle deep. Minor trespass may be necessary! Place names on the preliminary route (Fig.03) evoke a Saxon landscape heritage where Mump and Zoy refer to islands, and Andersea offers a highly descriptive accented view. The route is as follows: Burrow Mump - down Barrow Lane to Broad Drain to Henleys Farm to Aquaduct, along the River Parret to Raymonds Farm, to and through Andersea to Westonzoyland, to Langmead Drove via Disused Airfield, to Middlezoy, down Holloway

Fig.03 Snapshot of OS Explorer 140 (33:34). Laura Denning, 2018.

Road to Othery, over the A361 to Pathe, to War Moor and back to Burrow Mump. This (approximately) ten mile round trip will be followed by more watery explorations including 'A Feminists Guide to the Bridgewater and Somerset Canal' - 13 selected feminist artists and scholars on a barge, following the 13 mile stretch of isolated and dislocated man-made waterway, and a wholly transgressive slide into the rhynes around King Sedgemoor's Drain (basically an act of trespass) with Professor Owain Jones and his inflatable canoe.

During December 2018 I experimented with and extended these strategies during a month long visit to Bangalore for '#ethnohydro@ Srishti: Mapping the Climate,' a studio at Srishti Institute of Art, Design and Technology as part of their annual Interim Programme. The intention was to explore our local and global relationship with a changing climate, and work towards a collaborative and immersive installation and event. We walked, most especially around Jakkur Lake. Our embodied, submersive testimonies contribute to the 'watery archive of meaning and matter' (Neimanis, 2012).

The studio focussed upon the water crisis in Bangalore, which has a population of nearly 12 million and faces a serious water crisis within the next 5 years. Only a generation ago, the city had over 900 tanks (reservoirs/lakes) providing clean drinking water to the population. Today there are less than 100, and the river which fed them is highly polluted at source.

I worked with students to develop collaborative maps of these tanks, using our bodies as sensory data collectors. Tuning into non-visual sensory experience, they developed 'scores', to generate a 'legend' for their maps. They then 'pooled' their ideas onto large collaborative maps, which required them to negotiate a shared space, whilst developing creative languages which might encourage people to connect with their environment, and invest in the future of the lakes and the water which is so vital for their future.

Research included visits to other tanks – one so highly polluted it spontaneously combusts, and one which is being nurtured back to life by a local community group, one which is currently drained, undergoing landscaping as preparation for a recreational space to compliment burgeoning development within the city, and one that has previously been built on but which floods during each monsoon season. Uncovering statistical evidence alongside autoethnographic narratives, and drawing upon the creative work undertaken during the residency, I am now developing new work in response to this extended site visit (Fig.04).

Scientists and climate historians have recently discovered that over tens of thousands of years the changes in the intensity of the asian summer monsoon corresponded with the waxing and waning of the polar ice caps. The monsoon can affect wind and ocean currents as far away as the North Atlantic and Arctic Oceans. The asian monsoon season is the biggest annual rainfall system on earth and brings rainfall to about half the world's population. Water connects the individual body and local communities into the hydrosphere cycles in and through which these water issues are manifested. The key objective of this research is to articulate, through arts practices, located subjectivities that can disrupt dominant discourses surrounding climate change. The connections between gender, poverty and climate change vulnerability

Fig.04. Collaborative Mapping #ethnohydro@srishti. Laura Denning, 2018.

is well documented. However, hydrofeminism opens up these relations:

> *But why should this history predetermine any appeal to biological matter as necessarily antifeminist or reductionist? The desire of water to morph, shape-shift, and facilitate the new persistently overflows any attempt at capture. Is not "woman" similarly uncontainable? After all, 'woman's' beings/becomings in these texts are not determined in advance - even as she may be, like water, temporarily dammed by dominant representations and discourse. As watery, woman is hardly (statically, unchangeably) 'essentialist.' She too becomes the very matter of transmutation*
> *(Neimanis, 2012: 101).*

Obviously, in the context of Monsoon Assemblages it is reasonable to ask what has Somerset Levels got to do with the monsoon? The research focuses upon creative responses to the challenge of living in a wetter world in different climatic regions (India (tropical), Arctic (polar) and UK (temperate) with the aim of giving range and focus to the question of whose location and subjectivity forms the core of the research, whose contributions to the watery archive of meaning and matter is made visible.

REFERENCES

Braidotti, R. (1994). N*omadic Subjects. Embodiment and Sexual Difference in Contemporary Feminist Theory*. New York: Columbia University Press.

Butler, J. (1999). *Gender Trouble and the Subversion of Identity*. London: Routledge.

Crang, M. and Cook, I. (2007). *Doing Ethnographies*. London. Sage.

Cudworth, E. (2005). *Developing Ecofeminist Theory*. London: Palgrave.

Hawkins, H. (2013). *For Creative Geographies: Geography, Visual Arts and the Making of Worlds*. London: Routledge.

Irigaray. L. (1985). *This Sex Which Is Not One*. Trans. C. Gill. Ithaca, NY.: Cornell University Press.

Irigaray. L. (1980). 'When Our Lips Speak Together.' Trans. C. Burke. *Signs* 6(1): 69-79.

Massey, D. (1994). *Space, Place and Gender*. Cambridge: Cambridge University Press.

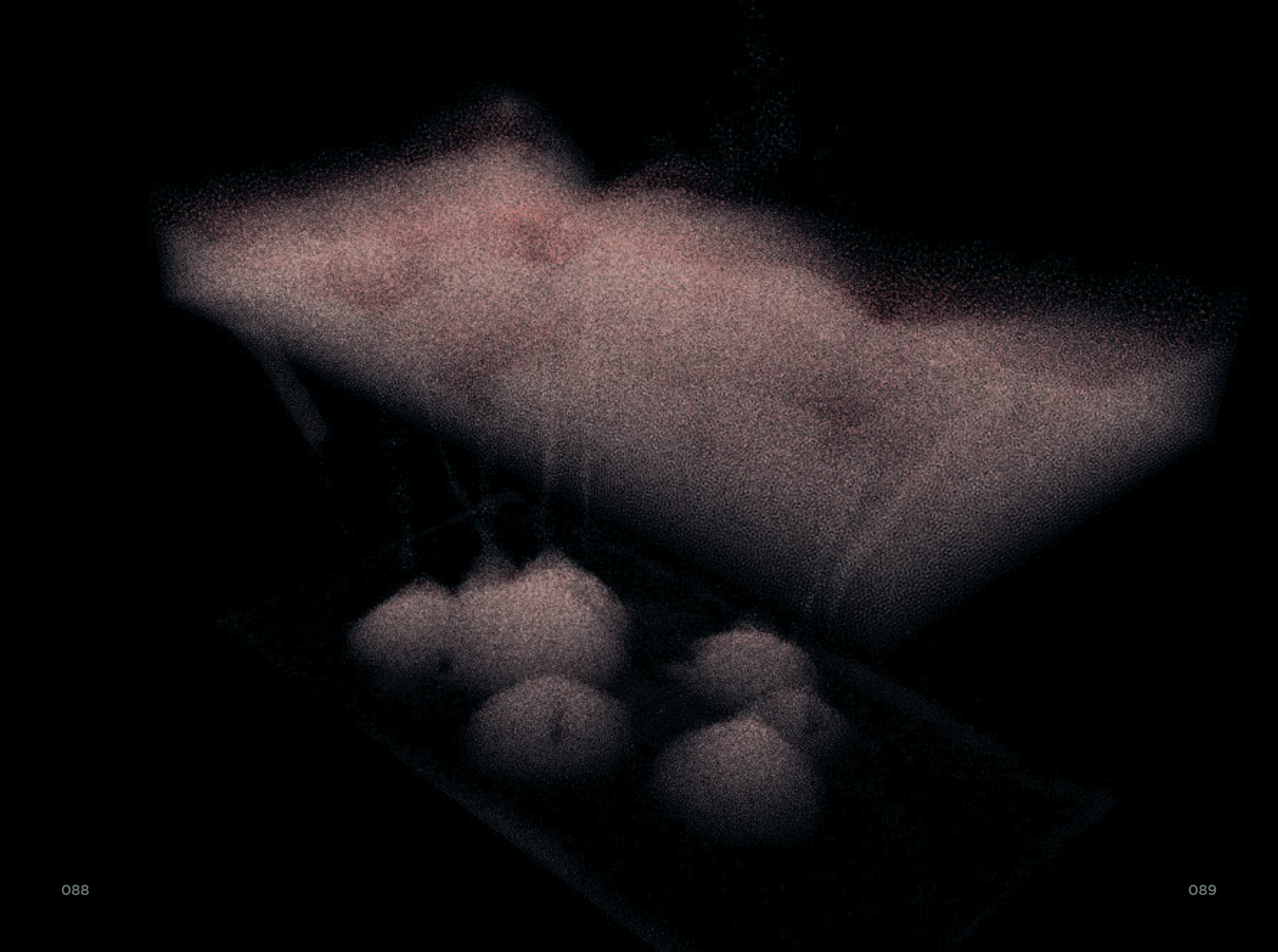
Massey, D. (2005). *For Space*. London: Sage.

Milton, K. (2006). *Loving Nature. Towards an Ecology of Emotion*. London: Routledge.

Neimanis, A. (2012). 'Hydrofeminism.' In: Gunkel, H., Nigianni, C. and Soderback, F. (eds.). *Undutiful Daughters: New Directions in Feminist Thought and Practice*, 96-115. New York: Palgrave Macmillan.

Wikipedia. (2017). 'Fieldnotes.' Available at: https://en.wikipedia.org/wiki/Fieldnotes).

P088-089 Simulation of a fiddler crab burrowing into sediment. Georgia Trower, 2018 Software: Real Flow.



MUSICAL NARRATIVES OF OIL EXPLORATION AND SEA DEGRADATION FROM THE NIGER DELTA

Olusegun Stephen Titus is a University lecturer at Obafemi Awolowo University, Nigeria. His work focuses on environmental ethnomusicology because musical narratives of coastal and environmental issues give insights into environmental degradation and offer the best way to speed up awareness in the developing world. Before coming to Obafemi Awolowo University, Olusegun taught at Federal College of Education, Okene, Kogi State, Nigeria, and while there, he started a environmental sustainability campaign through TAO community radio. In 2014, he received a A. G. Leventis Postdoctoral Fellowship at SOAS, UK. Olusegun earned a Bachelor of Art and a PhD in ethnomusicology from University of Ibadan, Nigeria in 2013.

Introduction

The discovery and production of oil in Oloibiri and elsewhere in Niger Delta in the late 1950s brought unimaginable hazards to humans, the sea and aquatic species and spaces, as a direct impact of oil exploration and neglect of the oceanic environment. Many musicians have seen oil exploration and its attendant environmental degradation as a site for an art form rooted in resistance. The paper argues that popular music has become a vehicle to powerfully reflect the hazardous conditions of water in the Niger Delta and that music has been used to explain the devastating effects of oil extraction on water, the sea, fish and other aquatic creatures. The paper elucidates the advocacy that music play in environmental and sea clean-up, and the restoration and restitution of a more sustainable environment.

Music produced by artists such as Fela Anikulapo Kuti and Felix Liberty have served as markers of resistance to how oil corporations have polluted the sea and other watery spaces in the Niger Delta. Music, as sound space of resistance, has cemented a synergy between activists and enclaves of extraction in an attempt to promote environmental sustainability and to reclaim access to freshwater and farming. The music produced by these artists seeks to draw attention to the fate of both humans and non-humans in the face of oil exploration and its negative consequences. This paper engages with Rob Nixon (2011)'s concept of slow violence and environmentalism of the poor and is unpinned by the discourse of Pacific Ocean ecomusicology, in which the texts of songs are used to explain global social and environmental degradation. This gives some insight into the problems and values of the ocean as signifier of global environmental crisis. Ecomusicology informs the study because it emphasises the triangularity of culture, environment and human beings (Allen, Titon and Glahn, 2014). In the paper, the ecomusicology of the

music of the Pacific Ocean is extended to analyse oceanic degradation elsewhere. On the basis of ecomusicologal theory, the paper employs textual analysis of the song texts and draws out several themes from them.

Overview of Eco-musicology

Several studies on the relationship between the environments, nature and music are evident in scholarly work. Taylor (2011) argued that birds have been muses to composers through the ages and that birdsong can provide more than composers' inspiration. Silver (2015) writing about north-east Brazil, observed that Luiz Gonzaga's songs reference the songs of migrating birds. They describe the meaning of bird calls in relation to the arrival of rain or drought: purple-throated euphonia's call heralding rain and laughing falcon's call heralding drought. Guy's (2009) research into popular music in Taiwan recorded that it frequently referenced natural phenomena and named places, such as waterways. Of particular significance was the Tamsui River. He argued that the river had captured the imagination of songwriters for decades and that song, as representations of the once vital and now toxic river, had informed a Taiwanese environmental imagination. His analysis of the lyrics of songs about the Tamsui River produced a green reading of popular music in Taiwan. Tailor and Hurley (2015) echoed the need for interaction between music and the environment, noting that it can potentially bring about social stability and musical responsibility. Pedelty (2013: 44) encouraged a wider discussion of popular music and environmental matters. He noted that 'environmental matters have not been widely discussed in popular music studies and hopefully scholars will see this shortcoming as a new opportunity.'

Rees (2016) examined the ecological songs that emerged in the wake of modernisation in China. In her landmark research on popular music and the mediation of traditional ecological knowledge, she elucidated the sudden awareness of China to ecological songs. Her study referenced a wealth of current concerns over the environment, social change, and disappearing traditional arts, thereby tapping into a sense of nostalgia for a more locally rooted past. This echoed Rehding (2011), who argued that ecomusicology could take one of two approaches to the environment - apocalyptic or nostalgic. Since the literary arts focus mainly on an apocalyptic approach, he suggested that ecomusicology should rather appeal to the nostalgic motive of environmental love. He argued that 'many in the narrative arts have taken the attention-grabbing apocalyptic route to raise awareness by instilling a sense of acute crisis in its audiences. It is quite possible that the most productive way forward for ecomusicology will be to follow the alternative route' (Rehding, 2011 : 414).

In this essay, I analyse songs by popular Nigerian musicians Fela Anikulapo Kuti and Felix Liberty, popularly known as Lover Boy, and Inetimi Alfred Odon, popularly known as Timaya, which reference the Niger Delta, its former beauty and current degradation. Following Pedelty (2013), the paper looks at how popular music in Nigeria engages the past cleanliness and current pollution of the delta and the Atlantic Ocean. The songs invoke human responsibility for the environment and the sustainability of the Delta through keeping oil spills from the ocean and its beaches. They remind their audiences of the need to be responsible by taking plastic waste from the ocean and helping to keep it clean for aquatic survival and the enjoyment and safety of the humans who live around it. In doing so, they adopt both apocalyptic and nostalgic approaches to the devastation of the Niger Delta.

The Niger Delta

Africa's most extensive wetlands are located in the Niger Delta, the center of Nigeria's oil production region, with approximately 2.5 million barrels of oil produced every day (Timsar, 2015; Bassey, 2013; and Okuyade 2011). The delta is home, by some estimates, to over sixty ethno-linguistic groups, with the Ijaw representing the largest of these. The Nigerian federal government maintains tight control over the oil monies and their distribution and disagreements are wrangled out in Abuja, the capital. Although revenue allocation to the region has increased since 1999, and the major oil-producing states such as Bayelsa are awash in oil revenue, the vast majority of Ijaw and other so-called oil minorities see little benefit from petro-wealth.

Rob Nixon's (2011) concept of slow violence informs this study:

> *As by slow violence I mean a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attrition violence that is typically not viewed as violence at all. Violence is customarily conceived as an event or action that is immediate in time, explosive and spectacular in space, and as erupting into instant sensational visibility. We need, I believe, to engage a different kind of violence, a violence that is neither spectacular nor instantaneous, but rather incremental and accretive, its calamitous repercussions playing out across a range of temporal scales. In so doing, we also need to engage the representational, narrative, and strategic challenges posed by the relative invisibility of slow violence*
> *(Nixon, 2011: 2).*

This assertion by Nixon can aptly be applied to the environmental conditions of the people of the Niger Delta that spans decades and will affect children yet unborn. Slow violence characterises what Nixon (ibid.) calls the environmentalism of the poor:

> *Those people lacking resources who are the principal casualties of slow violence. Their unseen poverty is compounded by the invisibility of the slow violence that permeates so many of their lives. 'The poor' is a compendious category subject to almost infinite local variation as well as to fracture along fault lines of ethnicity, gender, race, class, region, religion, and generation. Confronted with the militarization of both commerce and development, impoverished communities are often assailed by coercion and bribery that test their cohesive resilience*
> *(Nixon 2011: 4).*

The assertion is rightly suited for the Niger Delta people who live in abject poverty despite the wealth being extracted from their territory. This point is made in the following excerpt from a song by Lover Boy:

Since first October 1960 we get Nigeria	Since October 01, 1960 of Nigeria's Independence
We'll still they live like people	We are still living like those
Weh de suffer from serious malaria	Suffering from chronic malaria
They say we small oo de use us	They said that we are a small ethnic group
See them fool us they	They have been fooling us
Call us minority, e yee ee yee	They say we are a minority ethnic group
They say we small oo they fool us	They said that we are a small
Use us, put us for austerity	They use our resources and put us in hunger
And when we complaining ooo	And when we complain
Eeee them start to kill us	They begin to kill us
And when we complaining ooo	And when we complain
Eeeee them start to burning ooo	They start burning our houses
They take everything o	They take everything in our land
With their vampire strategy o	With their vampire strategy
Drill our oil	Drill our oil
They kill our fishes	They kill our fishes
Put us for hunger e yo	Put us in hunger
Ana we yi oche	In our land

This song references the environmental degradation that Niger Delta people face on a daily basis. Since independence these people have not had a sense of economic belonging, health or well being: 'de still they live like people that suffers from serious malaria.' Most live in abject penury, hunger in the mist of wealth and suffer lack of access to schools, hospitals, electricity and other social amenities.[01]

> *In a globally connected world, there is a price to pay for insatiable desires for consumption, locally, nationally, and internationally. A dear price is paid, which includes the loss of life, the destruction of property and infrastructure from the military attacks and youths' counterattacks, environmental devastation, the continuation of client-state relationships, underdevelopment, and the demise of future possibilities. This is true for the Ijaw people, Nigeria's well-heeled politicians, and for her oil-industrialized trading partners. The endless search for oil outstrips compassion...scramble as a gluttonous and deadly routine materializes. Oil extraction routines mean that there are few opportunities for education and employment locally, despite the oil riches of the region*
> *(Timsar, 2015:73).*

Because Niger Deltans are regarded as small ethnic groups, they are ignored and exploited: '*they say we small oo de use us, see them fool us they call us minority*.' The Niger Delta has been stripped of its economic freedom by transnational corporations fully aided by the Nigerian government: '*they take everything o*,' looting the oil, the life, the land, the resources and even peoples' health. Bassey (2013) has

drawn attention to the environmental atrocities committed by the giant oil corporations in Nigeria.

> *2,105,993 barrels of crude oil were spilled into the Niger Delta environment and water bodies between 1976 and 1990 in a total of 2,800 incidents. Outstanding incidents include the rupturing at Shell's Forcados terminal in 1979 where 570,000 barrels were spewed into the estuary and adjoining creeks. Texaco has its day in 1980 at Funiwa, where 400,000 barrels of crude oil were emptied into coastal waters and destroyed 340 hectares of mangrove forests. For Mobil, their landmark spill was recorded in January 1998 when their Idoho platform released 40,000 barrels of crude onto the Atlantic coast, affecting at least 22 coastal communities*
> *(Bassey, 2013: 92)*

He analysed the rate of oil spillage on the water bodies and environment in the Niger Delta as one of the worse in the world, as illustrated in Table 01. This table shows that within 24 years (1976-1999) about 2.5 million of barrels of oil were spilled into the ocean and the environment of the Niger Delta. High levels of spillage still occur. This has had enormous impact on the health of the body of water and the people living there.

Decades of oil extraction in Nigeria have translated into billions of dollars that have spell nothing but misery for the masses of the people. The country offers a model to be avoided and it is time for Africa to step back and review the situation into which she has been plunged. The preservation of the environment, the restoration of polluted streams and lands, the recovery of the people's dignity will only come about when citizens stand away from the pull of barrel of crude oil and understand that the soil is more important to our people than oil and its spoils (Bassey, 2013: 128).

Niger Deltans suffer the double tragedy of the lack to right of expression. Despite the economic sabotage carried out in their land they are denied the right to talk or express their pain. Several killings have taken place and the lives of communities that speak up against the exploitation of their environment have been destroyed (And when we complaining ooo, eeee them start to kill us). Any form of protest has been returned with killing and destruction.

In a globally connected world, there is a price to pay for insatiable desires for consumption, locally, nationally, and internationally. A dear

YEAR	NUMBER OF SPILLS	VOLUME IN BARRELS OF OIL
1976	128	26,157
1977	104	32,879
1978	154	489,295
1979	157	694,117
1980	241	600,117
1981	238	42,723
1982	257	42,841
1983	173	48,351
1984	151	40,209
1985	187	11,877
1986	155	12,905
1987	129	31,866
1988	208	9,172
1989	195	7,628
1990	160	14,941
1991	201	106,828
1992	367	51,132
1993	428	9,752
1994	515	30,283
1995	417	63,677
1996	430	46,353
1997	339	59,272
1998	390	98,272
TOTALS	5,724	2,571,114

Table 01. Table of oil spills in the Niger Delta 1976-1999, as recorded by Bassey (2013:83).

price is paid, which includes the loss of life, the destruction of property and infrastructure from the military attacks and youths' counterattacks, environmental devastation, the continuation of client-state relationships, underdevelopment, and the demise of future possibilities. This is true for the Ijaw people, Nigeria's well-heeled politicians, and for her oil-industrialized trading partners. The endless search for oil outstrips compassion...scramble as a gluttonous and deadly routine materializes. Oil extraction routines mean that there are few opportunities for education and employment locally, despite the oil riches of the region (Timsar,

2015:73). Fela Anikulapo expresses the pain of having so much water in Africa and yet the majority of African citizens do not have access to good water:

Na so so water for Africa	There are great bodies of water in Africa
Plenty plenty water for Africa	Plenty water for Africa
Water underground	Water underground
Water over ground	Water over ground
Water in the air	Water in the air
Ordinary water to drink	Yet drinkable water for common
For man n ko o E no de	Man is a problem

This is a direct result of pollutants released into the environment by the extraction of fossil fuel. The craze for oil drove the oil companies and their allies to destroy the aquatic environment to the detriment of human health and safety. In another song, Fela Anikulapo Kuti narrates the important of water to life:

If you wan drink	If you are thirsty
Na water you go use	It is water you will use
If you wan bath	If you want to bath
Na water you go use	It is water you will use
Water eno get enemy	Water does not have an enemy

The catastrophic effects of sea and water degradation in Niger Delta area has made water the enemy of common people, because it is not use able and poisons the fish they eat.

Conclusion

In this paper I have examined the lyrics of three popular songs that refer to environmental degradation in the Niger Delta. The songs highlight that transnational corporations in collaboration with the government of Nigeria have brought unimaginable suffering to the communities that struggle daily without useable water due to oil spillage into water bodies. The songs are representative of the poverty of the people whose livelihoods as fishers have been destroyed. To date the effects of oil exploration and exploitation still affect the availability of water, whereas the multinational corporate and their allies live in affluence. In the Niger Delta, popular music, like poetry, is a weapon, offering a kind of activism. The cleaning of Niger Delta is still a current struggle; the songs remind of the polluted areas and the need for urgent attention.

NOTES

01 It is worrisome that what the Niger Delta received was a University and National Youth Service Corps Orientation camp, but no good schools, hospitals, electricity or other social amenities.

REFERENCES

Allen, A. S., Titon, J. T. and Glahn, D. V. (2014). 'Sustainability and Sound: Ecomusicology Inside and Outside the Academy.' *Sound and Politics* 8 (2): 1-20.

Bassey, N. (2013). *To Cook a Continent: Destructive, Extraction and Climate Crisis in Africa*. Cape Town: Pambazuka Press.

Guy, N. (2009). 'Flowing Down Taiwan's Tamsui River: Towards an Ecomusicology of the Environmental Imagination.' *Journal of the Society for Ethnomusicology* 53(2): 218-248.

Okuyade, O. (2011). Rethinking Militancy and Environmental Justice: The Politics of Oil and Violence in Nigerian Popular Music. *Africa Today* 58 (1): 79-101.

Pedelty, M. (2013). 'Ecomusicology, Music Studies, and IASPM: Beyond 'Epistemic Inertia.' *Journal of the International Association for the Study of Popular Music* 3(2): 32-47.

Rees, H. (2016). 'Environmental Crisis, Culture Loss, and a New Musical Aesthetics: China's 'Original Ecology Folksongs' in Theory and Practice.' *Journal of the Society for Ethnomusicology* 60(1): 53-88.

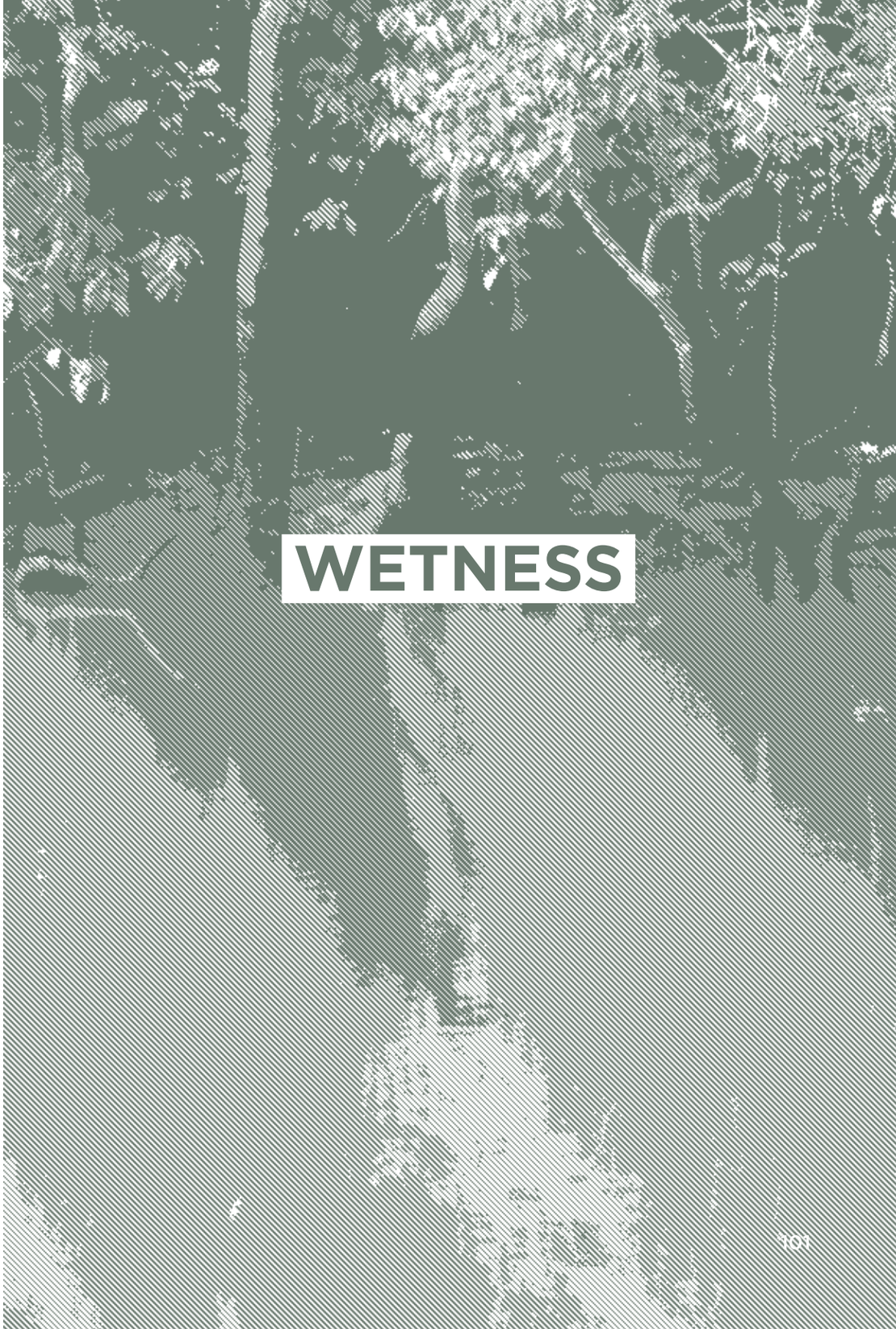
Silver, B. M. (2015). 'Birdsong and a Song about a Bird: Popular Music and the Mediation of Traditional Ecological Knowledge in Northeastern Brazil.' *Journal of the Society for Ethnomusicology* 59(3): 380-397.

Shaxson, N. (2007). *Poisoned Wells: The Dirty Politics of African Oil*. New York: Palgrave Macmillan.

Taylor, H. (2011). 'Composers' Appropriation of Pied Butchered Bird Song: Henry Tate's 'Undersong of Australia' Comes of Age.' *Journal of Music Research* 2: 1-28.

Taylor, H., and Hurley A. (2014). 'Music and Environment: Registering Contemporary Convergences.' *Journal of Music Research* 20 (1): 1-18.

Timsar, R. G. (2015). 'Oil, Masculinity, and Violence Egbesu Worship in the Niger Delta of Nigeria.' In: H. Appel, A. Mason, and M. Watts. (eds.). *Subterranean Estates: Lifeworlds of Oil and Gas*, 72-89. Ithaca, NY. Cornell University Press.



WETNESS

ANURADHA MATHUR AND DILIP DA CUNHA INTERVIEWED BY CHARLOTTE BIRCH, SARAH BASS AND GEORGIA TROWER[01]

Anuradha Mathur is Professor of Landscape Architecture at the University of Pennsylvania, Philadelphia, USA. Dilip da Cunha, an architect and planner, teaches at Harvard University, Columbia University and at Srishti School of Art, Design and Technology in Banglaore. They are authors of *Mississippi Floods: Designing a Shifting Landscape* (Yale University Press, 2001), *Deccan Traverses: The Making of Bangalore's Terrain* (Delhi: Rupa & Co., 2006), S*oak: Mumbai in an Estuary* (Delhi: NGMA and Rupa & Co.) and editors of *Design in the Terrain of Water* (A+RD Publishers, San Francisco, 2014) that grew out of a symposium at Penn Design (http://terrain.design.upenn.edu/about). Da Cunha's new book titled T*he Invention of Rivers: Alexander's Eye and the Ganga's Descent* was published by the University of Pennsylvania Press in 2018. Mathur and da Cunha were recipients of a Pew Fellowship Grant in 2017.

Sarah Bass, Charlotte Birch and Georgia Trower completed their RIBA Part II iat the University of Westminster in 2018, where they studied with Design Studio 18 for two years. Sarah's final thesis project 'The Hyacinth Collective' interrogated the scientific and architectural potential of the water hyacinth. Restoring the rift that exists between agriculture and the Bangladesh river system, this created a public interface for rural farming communities living along the river. Charlotte's final project 'The Fluvial Collective' was exhibited at the Blueprint for the Future exhibition in 2018 and published in *Blueprint Magazine* 360. The project created a community co-operative in Bangladesh involving three rural poor communities vulnerable to river erosion exacerbated by illegal sand mining. Georgia designed 'Epicarp Exchange,' a community cooperative based in Bangladesh that looked into the development and production of a natural water filtering prototype consisting of fruit and vegetable peel as her thesis project. During the course of her final year, she also worked for Monsoon Assemblages as a student assistant, editing *Monsoon [+others] Airs* and developing maps of Chennai.

On the relationship between drawing and writing

Charlotte Birch (CB): We would like to start with some drawing questions. You say your drawings work analogously with the writing in your books. So they are narratives in themselves and layered with lots of different information. How is it that you approach constructing these drawings?

Anuradha Mathur (AM): In *Mississippi Flood*s (Mathur and da Cunha, 2001) which was our first collaborative work, the drawings led the work. We didn't start the project as a book, we always thought of it as prints and an exhibition. The process of how we were going to do things evolved with the project itself. It was often in later reflection that we would become aware of why we worked in particular ways, with particular mediums. It was in later reflection that the layering of the screens became analogous to the layering of silt in the landscape. We

thought of the drawings less as they appear in the book, where all you see is a flattened image (Fig.01), you don't even see the layered glossy / non glossy quality of the print. The actual prints have a very different presence. So for us it was a process of construction rather than a process of representation. As we were making these prints we were constructing a landscape. There were many layers to these prints, some got lost in the process, so there was a negotiation in the making of the print itself.

So that was one part of it in relationship to materiality. There was a lot of research and archival work that involved sitting in the offices of the U.S. Army Corp. of Engineers collecting maps. All that came together through the process of print making. So we didn't start with the idea that we were going to write all of it and then do the prints as illustrations. It was really the other way round, each print became a story and then we wrote the book afterwards. It was slightly different when it came to Deccan Traverses, when we had a different idea about what the drawings were doing.

Dilip da Cunha (DdC): I would extend the analogy of working between text and image to archival work as well.

We navigate the archives as we do landscape. It may sound strange, but in an archive, we do not look into a past; we look into a present that gathers a past. The past and the present become simultaneous layers.

So the text is speaking to us in particular ways and images are also speaking to us in particular ways and our interest lies in bringing them together. In the printmaking process we saw ourselves as both constructing and designing with the sensibility of traces of the past and programmatic conditions in the present. In *Mississippi Floods*, the screen printing process led the design process. In *Deccan Traverses* (Mathur and da Cunha, 2006) it was our own movement through the landscape. We did not want to start with a city as an image given to us in a map.

AM: 'What is Bangalore?' was the question we asked ourselves at the start of the project. To what does it refer to, and to where does it extend?

DdC: If the print making process in *Mississippi Floods* was a way to not restrict ourselves to a river defined by two lines on a map, in Bangalore, it was to not restrict ourselves to a city within a boundary. The reference in both was the frame of the screen rather than a river or city. We are then able to say that this is a landscape before somebody makes a river or city out of it. When screen printing we begin to see that.

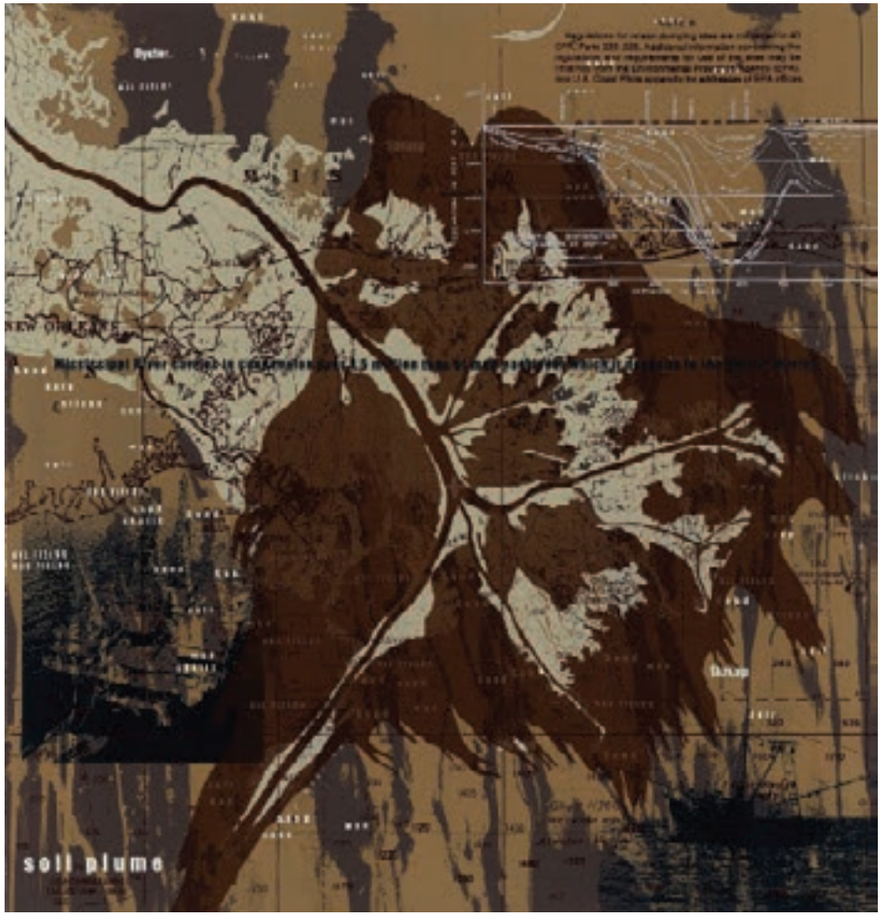


Fig.01. 'Eroding Continent.' From *Mississippi Floods: Designing a Shifting Landscape*, 138.
With permission from Anuradha Mathur and Dilip da Cunha.

AM: Photography became significant in our Bangalore project. We did use photography in *Mississippi Floods* but it was much more about the linear and folded panorama.

In Bangalore, we discovered photography in a different way, it became more assemblage like.

Some of the photographs were done to make drawings, and less with the intention of making photographic works. For instance, the flower market photograph (Fig.02). That was something we never intended as a photographic image. When we looked at the image though, we thought that it spoke more than any drawing we could make of it. It spoke a language. So we started to then push how would we photographed other moments of Bangalore. We began using photography in multiple ways, rather than only sequentially. It opened up a vocabulary which we picked up in Mumbai in other ways.

SB: Was screen-printing a technique that you knew how to do before you had started your research or was it something that you learnt as the research progressed?

AM: While we were familiar with screen printing used for very flat, poster-like works, we found it presented interesting possibilities through transparency and layering. We had uncovered a lot of material in archives and in Army Corps offices, whether it was maps or newspaper articles, and transferring these 'found' documents and images onto the screen at a certain scale allowed us possibilities that other printing techniques did not.

DdC: Whether we do screen printing or photography or archival searches, we are uncovering and constructing imaging in a certain way. We discover things in the process of screen printing that add to our sense of the landscape. So when you ask did we chose screen printing, I think to some extent we just landed on it and then it started speaking to us. It told us about the place. For example, it was not so much that we chose screen printing because the layering allowed us to show erosion. It drew our attention to erosion. It moves both ways: imaging speaks back. It goes back to what Anu was saying, that the image is not a representation but a construction and when you talk about it being a construction, it speaks analogically in many ways.

AM: And that extends to photography. It wasn't that we started with saying 'I want to do a photograph of this area and how best can I do it.' Photography responded to the way we walked the landscape, the way we traversed. So in making the flower market assemblage, we walked a corridor above the market and we kept shooting down from all around. When we assembled it looked like a plan from above, although there is not a place that you can see it like that. It was trying to get closer to the experience of a market, rather than one specific view that has the perfect light. It is the ordinariness of this landscape that was important, we weren't looking for that one landscape moment.

In *Soak, Mumbai in an Estuary* (Mathur and da Cunha, 2009), if I could jump to another of our projects, there are a series of photographs in the middle section of the book titled 'Estuary,' which are strips of many moments of Mumbai. When we look back, we enjoy those the most, but they were the last thing we did, they were all the left overs we hadn't used elsewhere. They arose from the way we had seen and shot the landscape, not knowing why or what we were going to do with the material. We were walking and things were moving at different speeds, or we were still and something was moving. We did it intuitively. I remember during the last month of preparing the book, we kept looking at all this stuff and I said to Dilip, we need to do something with it, and we found a structure to bring it in.

DdC: Sometimes I feel that what pushes the richness of an image and how it then features in the way we write about it, or how it actually speaks to our own minds, comes from an economy of means. It's about making do with what we have. This is especially true of our work in India. We would be there for two to three months and then come back to the USA, 10,000 miles away. We would then look at what we had. There were times when we said, 'I wish we had done this or I wish we had done that.' But otherwise it was saying 'Let's see what we can do with what we have.' Then you are actually forced to keep reading into what you have and you realise there is a lot more there than you thought.

AM: The process of editing, selecting and reworking is something we engage with constantly in the making of our work. I'm thinking in terms of your earlier question about the writing. What has shifted is that in *Mississippi Floods* we wrote the book well after the exhibition was already traveling. In that sense the prints really led the book. But in *Deccan Traverses* there was a simultaneous working with the writing even though the book didn't get published in time for the exhibition. The screen prints we had done for the exhibition were eight feet tall. The exhibition opened in the Glass House in Bangalore which had been modelled on the Crystal Palace. It was semi open, like having an exhibition in Hyde Park. When the book was finally designed and produced, which was after the exhibition, we knew that the prints would be really small, offering not much more than a texture to the book. We didn't expect people to read the prints at that size, and still don't. The book was about taking out, extracting, and pulling out the layers of the prints, relying on line drawings, narratives and images embedded in the prints to tell the story. The book had its own presence in a different way. For Soak: Mumbai in an Estuary we were very keen that the book be released at the same

Fig.02 Krishna Rajendra Market in Bangalore. From *Deccan Traverses: The Making of Bangalore's Terrain*, 191.
With permission from Anuradha Mathur and Dilip da Cunha.

time as the exhibition, almost as the catalogue of the exhibition.

DdC: But we did not just write the book, we drew it as well. The images are very much part of the writing process. It's amazing how much a thesis can be thought about through drawing. Many students look to writing as a primary driver, and that makes me uncomfortable. We can't just write. We have to draw, we have to find some way in which to image, and then the words come. This again refers to the analogous construction of image and text.

On sectional drawings

Georgia Trower (GT): In terms of the construction of drawings, sectional drawings through the landscape are extensively used in your work. I wonder how you generated these?

DdC: Are you talking about the drawings in *Soak: Mumbai in an Estuary* particularly?

SB: Yes. Both Charlotte and I have looked at mapping rivers in our studio projects. We found it very difficult to find data on the elevations of the rivers. Did you have that challenge?

AM: Our push was to really erase the idea of the river. There was a time I remember when Diliip hand drew 159 sections through Mumbai (Fig.03). He projected them from a contour map of the 1920's. It was the most beautifully articulated map and some of topography, in particular the hills of the national Park to its north, hadn't changed.

DdC: But what was important was the location of the sections, each was done through a tank.

AM: By tank we mean a reservoir that used to exist but not anymore.

DdC: The image was constructed with a certain rigour. We took every tank and cut a section through it. I didn't know there were 159 until we were trying to make an etched model from this drawing for the exhibition!

AM: This is a case where the historical reading of maps plays a significant role in constructing the drawing. There were once so many of these tanks or talaos as they are called. We made a composite drawing of them from various historic maps. I think there is a line drawing of them in the book. It is so small that the tanks are little red specks. It speaks

Fig.03 Sections through Mumbai. From *Soak: Mumbai in an Estuary*, 46.
With permission from Anuradha Mathur and Dilip da Cunha.

of a time when people operated by rain collection before Mumbai opted for piped water from an infrastructure of rivers. The flooding of the Mithi River that we were looking at in the book highlighted the significance of this shift from tanks to pipes.

The tanks give a rhythm and measure to the sections. Students try and copy the look of our sections without paying attention to this rigor. They often cut sections in GIS by giving a single command and it's not really the same thing as drawing them. In our sections of Mumbai what was also very crucial was that at the point where the section line intersects the coastline, we invert the section. On one side land is black; on the other the sea is black. That just happened as Dilip was drawing it. It wasn't as if we had thought about it before hand.

DdC: We do not show the sea sitting on land as conventional sections do. To us, it was a gesture that liberated water.

AM: When this was applied across 159 sections, an amazing ghost of a coastline appeared, dissolving from both sides simultaneously. It said that the coastline, which plays such a prominent role in legislation, does not really exist. So there was a lot that went into that section drawing. We were seeking a logic in the landscape that would give it a rhythm. I wouldn't say it was an accident, but it was a process of testing out and probing.

When we look back at those sections they articulate certain ideas that we are thinking about now. An estuary, to us, is not about land and sea but monsoon and sea. The sections help us say that the solid black on both sides of the line is really a wetness: rain falling on the hills and the sea. The drawing constructs their relationship inadvertently. It wasn't that we decided that our body of work on Mumbai was going to be about sections. It was this particular drawing that pushed us in that direction.

DdC: We are speaking much more about the section than you asked for.

SB: No, no, its interesting!

AM: I don't know if you noticed, but we use different kinds of sections. Some sections of Mumbai were done from plan, but others were done from photographs.

DdC: We have a real urge for the ordinary. Just as we walk through a landscape when we photograph, not looking for that one pristine

moment, we also section in series. We walk across the land and we take sections from one moment to the next. It's boring work. It's very ordinary. Walking the landscape and taking photographs and walking the map and taking sections are analogous. When one does these sections and puts them up, it's almost magical. They speak with the rhythm of the tanks, but they were not drawn with a prior sense of that rhythm.

On data

AM: There's something else I would like to say to your point about data availability. When we did the Mumbai project, it was a moment when people had GIS data, but they were for some reason protecting and hiding it. We had to either pay a lot for this data or work with the maps we could find. We were not brought up thinking – I can't make a drawing unless I find the data. With our students in the first-year of the landscape program at Penn we go to site and make our own maps. They triangulate as a surveyor would do. When you do this, you articulate a landscape giving significance to what you pick to triangulate. When you get data very often it's much harder to pull out what is significant. There were moments in our work for *Deccan Traverses*, when we walked the bunds. You might have seen these bunds in Chennai, the embankments which hold the tanks. We decided to do our own survey of the bund. We estimated the heights, because there was no drawing available that could tell us what that section was and we felt that it was important to get that level of detail at where the plug was, where the weir was. It probably didn't take more than a day, we did field sketches and took sequential photographs and came back to our studio and constructed the traditional measured drawings with them.

Right now, I am working with students in the desert region of northwest India where its flat. There is no database that can help them because it is not about topography. The landscape is all about material changes—sand, salty sand, sandy sand. It's really interesting to see them struggle to build a drawing of the site. They have to invent ways to construct the site. The conventions don't work, so some of them are working with print making while others remain paralysed because they are relying too much on data they thought they could get.

On mapping

CB: In quite a few places in your books you are critical of mapping, especially when you are trying to map landscapes and terrain that are constantly changing. What techniques have you developed to respond to these conditions?

DdC: That's a very interesting question and we will probably be responding in part in our lecture tomorrow. When we began with the

Mississippi, we were critical of maps as representations. In our work in India, we saw how colonisers used maps as spatial devices to colonise time. Maps were about holding time and by extension, landscapes still. They were about the fixed versus the shifting.

In Mumbai, we constructed a provocation between land vs sea as a way of talking about space vs time. When people told us, you can't do anything for Mumbai because there is no space, we responded: you can do something for Mumbai in time. It's about seeing space in time rather than time in space.

It was one way of thinking beyond shifting versus fixed in landscape and the urge to map with increasing frequency. But now we have moved even further, seeing the map not as a means of representing a ground or even constructing one; but as a way of colonising the imagination. It is not just that the map precedes territory as Baudrillard writes, it is that the map presumes a surface. The geographic surface that makes itself available to the map, also makes itself available to territorialising. You begin to see that the problem is a surface to begin with. That's where we are now. We are asking: why do we presume a surface? So our critique of mapping now is not that maps are merely representations; they are means by which geography has disciplined the imagination to accept a surface.

AM: There is another point that we make about mapping. We can say it's about surface, but it is really about privileging the view from above. In our work on Mumbai, the idea of the estuary was a way of critiquing the colonising idea of an island city dividing land and water as drawn by lines on maps. Section as a technique became a way to move away from that. Not one section but multiple sections became a way to subvert the view from above. Now, in our explorations of wetness as an alternative to a geographic surface, we are even questioning the section.

DdC: We are moving away from a surface to wetness—the idea of living in wetness rather than on a geographic surface. We believe that wetness is an alternative ground of habitation that has been marginalised.

We are disturbed by the urge to extend mapping, to include other cultural modes of representation as maps. We see it as a kind of colonisation. Geographers Harley and Woodward in *The History of Cartography* (1987) insist that maps are so widespread that there is hardly a society in history that operated without maps of one form or another. A geographic surface allows these academics a common ground to bring together a wide range of representations as 'maps'. Are they assuming that all people see themselves inhabiting a surface?

AM: When map-makers go out to survey, they go out when it is not raining.

Maps are fair-weather landscapes.

In fact, British surveyors in India called the monsoon a foul weather season. Once that kind of language comes in, the monsoon is always an outsider. Maps portray a surface where things have a place. That has profound consequences today when we talk about flood, which to us is water crossing a drawn line. So when you say 'river,' someone decided that the river is where water should be and whether it shifts or not.

It is similarly the case with Google Earth. Their images are assembled from moments when there are no clouds. It is an extremely mediated view. In the Rajasthan desert where I am currently doing a studio, they go further to tint the place where they believe water to flow as blue. On the ground, this place is mostly sand and vegetation; water may come through once in a while making it appear river-like. But maps and Google Earth identify it as a river because they have chosen a moment in the hydrological cycle to anchor in, a fair-weather moment when an earth surface is mappable and land and water are separable.

DdC: Design is dependent on this surface and its articulation. We are seeing places where there were no rivers, bringing water from hundred and miles away just to have a riverfront. There is talk, for example, of creating a 'Thames' for Bangalore.

AM: They believe that they must have a riverfront to be a world-class city! And to have a riverfront, you must have a river.

DdC: But anyway this is all about water and divides. So we've come a long way from seeing maps as representational devices to seeing them as colonising devices and the means of a geographic imagination.

AM: It's not that we don't use plans and sections and other conventions of design. But in the way we use the plan, we are always very conscious that we are not just talking about territory. We try to draw our sites not as bounded entities but open-ended trajectories. In this sense, we try to work our 'infrastructurely'.

SB: In Soak you make design proposals towards the end of the book, which was quite a shift. We wondered what led you to include design proposals rather than purely research as in the the other two books? Was there a moment where you decided to make these proposals or was it something that evolved over time?

AM: My take on it is that even in our work on the Mississippi and Bangalore, which stop at a certain moment in a book and an exhibition, we saw ourselves not as researchers but as designers. The question for Mississippi Floods was 'How do you work in this landscape?' It led to finding a way to represent it. We didn't ourselves do projects, but we led many studios which took the kind of work we had done and developed it. But we ourselves didn't feel the urgency at that point.

DdC: I would put it a little differently. I don't think our effort was to represent. I think design begins from the way we see. The moment we see, we're already designing. So I think that what we did in *Mississippi Floods* and *Deccan Traverses* was to reveal the act of design or play up the seeing that had gone into the landscape and redesign it by seeing it differently. For example, in the case of the Mississippi it was not that the ground was given, but that someone, by seeing a line of separation had already designed it. And now the Army Corp. of Engineers is maintaining those lines, building them up and making levees and you as a designer, design behind them. So instead of accepting your role as a designer and the Army Corp. as an engineer, accept the fact that the Army Corp. has already designed, they are designers. You should go there and challenge that infrastructure by seeing the ground differently. If you see the same thing then you are just building on the backs on engineers. We found the same thing in India where the surveyors laid the ground down by seeing it for you. So you accept that design has already begun. If you look at it like that I would think that our projects on the Mississippi and Bangalore engaged in design up to a point.

In the case of Mumbai, we felt compelled because we had entered a field in response to the government's reactions to the floods of 2005. We wanted to show that if we saw differently, we design differently. We saw Mumbai as an estuary rather than an island.

We did not see floods, we saw rising and falling of rains and wetness. If you saw Mumbai as an island that was drained through rivers then flooding becomes a drainage problem. Whereas the government was approaching it as a drainage problem, we were approaching it as a wealth of wetness.

We were not seeing it as a problem at all, we saw it as welcome wetness. We felt compelled to take it a little further by actually making propositions that might translate our way of seeing for them. Design served the purpose of showing people the possibility and practicality of seeing a different Mumbai. Our projects are as practical as they are imaginative. It's not just about seeing differently but that seeing

differently has consequences and what these consequences might be.

AM: And there was an urgency to that moment. We realised that after the 2005 flood the conversations we read about or heard about in Mumbai were going in a trajectory which we knew would be disastrous. Even if there was no corruption, even if they had the best intentions, even if they did everything they said they would, it was the wrong thing to be doing. It was the wrong engineering, the wrong idea, it was not the direction to go. When we first approached some of the government officials and spoke with them, their response was, 'Why don't you give us your suggestions and we will put them in our masterplan?' That was when we realised we were not just proposing a different project, we were working out a whole different paradigm. In fact, going back in history, going back to the British Library, finding maps, and looking at maps with a certain eye we knew that we needed to rewrite the history of Mumbai and show that its 'islandness' was a constructed idea. How the island had been made became a very important enterprise for the project. So it didn't start with us doing some historical research that led to us mapping and then a project. We actually had a very clear idea of our project and we built Mumbai's past on that.

DdC: Another way to put it, we don't see the field of design in terms of theory and practice. We see the field of design as argument and demonstration.

So very often we have stayed with the argument and the demonstration. In the case of Bangalore and Mississippi we wanted the demonstration to be a public engagement. We had workshops and exhibitions that showed how we could move forward with this new imagination. In the case of Mumbai, we did the demonstration projects to show what was possible with an estuarine imagination as opposed to an island imagination. We did not really expect people to say 'why don't you implement these right away?' It may sound strange - but the purpose of exhibiting these proposals was not to build them from the drawings we had made. We knew that we had to make a translation from the drawings that we exhibited to the drawings that would be demanded of government for the project.

AM: Which we didn't mind doing because we knew the areas quite intimately, we had walked these places extensively and thought about what was possible.

DdC: But the moment you do that, there's a reduction. Because you're entering a world in which you say this is not about rain, it's about rainwater harvesting. You have to say no this isn't about rainwater harvesting this is about a wetness regime you want to bring in. Rainwater harvesting is literally in support of a river infrastructure that goes back to

the island thinking that has been drained off. So it's a funny give and take actually in a world that is so preoccupied with problem solving. So we hesitated. While demonstration has its power, we feel an example tends to become an exemplar. And that is dangerous. You can lose the project to change public imagination and just become professionals implementing a scheme.

AM: There was also the idea that any one project cannot in itself bring the transformation necessary, one project through which we're going to save Mumbai from floods, it was a whole trajectory of thinking. Of course, when the government asked us to actually take the proposals forward we were surprised but willing. However, getting anything past the government bureaucracy was so complicated that at some point we realised that it was better for us to leave it to others. Our's was more an education agenda. There have been times when we have been disappointed that we were not able to go forward with developing some of our proposals further, but today when we look back we see that the ideas are been absorbed by the next generation. So in some ways we weren't planning for that moment alone as it wasn't something you could do overnight.

On teaching

GT: Speaking of students, what impact does your student's work have on your research and vice versa?

AM: We have carried our students along with some of the work we've done. For example, after developing our own work on the Mississippi we offered studios based on the research. For the Mumbai project, none of the drawings were done by students, they were all done by us because we just found them too slow! We were working on a very tight deadline.

DdC: Building again on analogical thinking, pedagogy has its own place in the way in which we operate. It opens up certain questions. If you look at teaching and students ... it is like communicating with the public. So when we have done public exhibitions we have treated the public like students. In another sense we don't treat our students as people we are simply educating. We are also learning in the process of engagement.

AM: Teaching has clarified our ideas.

DdC: The point that Anu was making about how the extraordinary becomes the ordinary can be seen and thought at the level of how a student is operating, let's say how the university environment is operating and how civic and public exhibitions are operating. For example, I'm doing a studio in Varanasi with Columbia students at the moment. Seeing how American students, or students from various parts of the world other than India, go to India and delve into a kind of complexity tells you that you don't know anything more than they do of a place. And I keep telling them, 'I am from India yes, but it doesn't mean that I know more than you do.' So when one sees the way in which they come to terms with a place, it tells you something about the multiplicity and complexity of a place more than it tells you about their limited understandings. There's so many ways of looking at anything and that's the way the public are. Everybody in the city is not looking at the same thing. They are all in their own world and operating exactly like this. And nobody knows anything more than anybody else.

AM: But I would say you've ignored the big thing: your students were able to do that because of a certain structure that you were able to give them. A structure doesn't mean it's a closed structure, neither is it a problem that closes down inquiry -- it actually opens and allows for a depth of engagement to happen.

DdC: I would say then if I'm looking at a fabric dyer in Rajasthan or a person making pots in Rajasthan or a weaver in Varanasi, these are people who are actually making place through a practice in ways in which students are making place in studio or by engaging when they go there. So when one looks at the pedagogical process as a way of engaging with place, it also opens ways in which I can understand. There's a lot of learning that happens in the process.

AM: I think students have pushed us to clarify what we are trying to do. We sometimes collate their work as part of the project without trying to force their work to merge with ours. Students are not our helpers, they are advancing their own ideas and we are learning from them as much as they are learning from us.

On working method

CB: We'd also like to know, during your projects do you work together throughout the whole process or do you each have your own individual interests that you then bring together?

AM: That question always comes up!

DdC: We say we fight a lot and we produce something. Both of us being trained as architects puts us on the same ground, but the practice of architecture is so broad. There's a sort of muddiness in our work. We both do everything. And of course we then talk about it all the time. Our daughter has realised this. She's the third person at the dinner table so now she doesn't stop talking because she knows that if she does we'll start talking about our work. But there's something to living and

breathing the projects that we do, which of course has become a little more difficult with our daughter growing up.

AM: I think there is a tendency to divide, like land from water. My story is that Dilip does everything and I help him out. I think we're muddy in a different way. His tendency is to challenge anything that you think you know. He has to break it down. It's an impulse and it's not easy. I don't start like that, I start more materially, with a more material intention about things. We process it in our own ways and then we fight over it. So initially I'll keep saying no, no, no, it cannot be and then I'll start saying yes, yes, yes.

DdC: Our work involves as much construction as deconstruction. I'm finding it more and more to be the case. So, with mapping, there has to be a simultaneous construction with deconstruction. For example, the breaking down of rivers and the critique of the geographic surface cannot happen without the alternative of rain and the imagination of wetness. Ubiquitous wetness and land-water surfaces are two different paradigms.

AM: That's Dilip's instinct ...

DdC: For me in order to have construction you must have deconstruction, so I do work more on that aspect of it.

AM: We had a long conversation about this with Dilip's new book *The Invention of Rivers: Alexander's Eye and Ganga's Descent* (da Cunha, 2018) coming out. At some point we decided that this was his book and not our collaborative project, because it has a certain way of deconstructing. The way that Dilip is able to delve into archival and historical material is really his way of thinking and articulating. While some of the book came out of our collaborative work, things we've been talking about and doing, it is something he does, it is what makes him tick. So at some point during the writing of the book, we said we really have to make this divide.

DdC: The book is much more about the deconstruction of a river imagination and now we're working on the construction of a rain imagination.

AM: We have an exhibition that we are working on where we are collating the construction side. We realised that the book would never have come out if we tried to do them both at once. We felt that it was important for the argument to be distinct in itself. Now we have the freedom to do this other work without having to pack it into one project. It was a hard decision and Dilip said, 'Are you sure? You don't want your name on this book?' I said, 'No!' I felt that the way Dilip thinks, deconstructs, and builds his argument ---that's his thing, what he's really interested in---it not something I can do.

On monsoon [+ other] Waters lecture

GT: So we understand that you are showing new work at the symposium tomorrow. Is there anything that you can tell us about the new projects you are going to speak about? Is it a new site?

AM: We will be primarily talking about the thesis in The Invention of Rivers.

DdC: What we want to do is to provide an understanding of where our books have come from and why we do what we do. It is calling for a serious shift in the way we do design and the way we approach design. Let's just say the role that design can play in the world today can be a lot more fundamental than it is. We believe that design can make a real difference in the world today. Architects particularly, more than anyone else, are peculiarly placed to take on that responsibility. Much of the lecture will be questioning the separation of land from water, which I call out as an act of creation. It does not just divide, it creates land and water from ubiquitous wetness. It is what has given us a geographic surface. So we're going to speak about that and then at the end we will talk about our studios and how we bring some of these ideas into them. So in a nutshell it'll be to look back at our projects through the lens of wetness. We now see we're not really talking about water, we're talking about wetness and how that wetness works in our imagination.

NOTES

01 This interview was conducted by Charlotte BIrch, Sarah Bass and Georgia Trower with Anuradha Mathur and Dilip da Cunha on the occasion of their visit to London to present a key note lecture at the Monsoon [+ other] Waters Symposium.

REFERENCES

da Cunha, D. (2018). *The Invention of Rivers: Alexander's Eye and Ganga's Descent.* Philadelphia, PA.: Pennsylvania University Press.

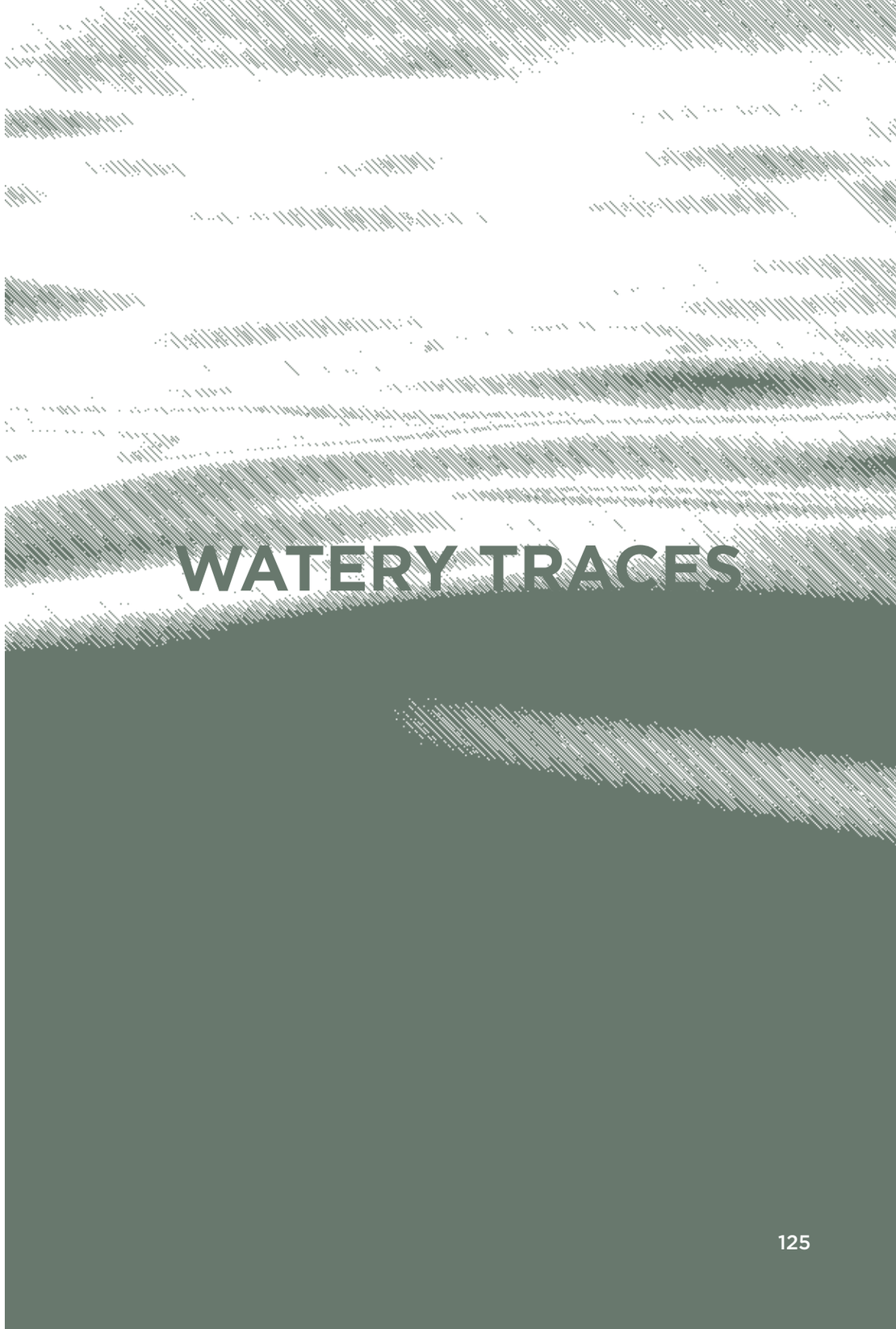
Harley, J. B. and Woodward, D. (1987). *The History of Cartography* . Chicago: University of Chicago Press.

Mathur, A. and da Cunha, D. (2001). *Mississippi Floods: Designing a Shifting Landscape.* New Haven: Yale University Press.

Mathur, A. and da Cunha, D. (2006). *Deccan Traverses: The Making of Bangalore's Terrain.* New Delhi: Rupa & Co.

Mathur, A. and da Cunha, D. (2009). *Soak: Mumbai in an Estuary.* New Delhi: Rupa & Co.

P122-123 Injambakkam backwater, Chennai, 2017. Lindsay Bremner.


WATERY TRACES

SOAKING CARTOGRAPHIES: OF WATERS, LANDSCAPES AND MATERIALITIES

Pedro Pombo is Assistant Professor (Visiting Faculty) at Goa University, India. He received his PhD in Anthropology from ISCTE- IUL, Portugal, with an ethnography on spatial belonging, local history and personal narratives in Southern Mozambique. He investigates traces of maritime circulations in the Indian Ocean engaging dialogues between cartography and archives, heritage and material culture. He also has been researching on topographies of Africa in India unveiled by textile aesthetics, stories of migration and contemporary art, inquiring about possible archaeologies of the contemporary in the Indian Ocean world.

Approaching the Coast

Departing from a series of visual experiments on the encounter of water and land in the Western coast of India - the island of Diu, Cambay Bay and Goa - this essay navigates towards the aesthetic and epistemological possibilities of water as a template for migration stories, architectural ensembles and visual and material circulations. It investigates how to unveil the traces that waters - salty oceanic water, monsoonal watery cycles - have left in landscapes, walls, objects and memories.[01] Text and visual collages act as the unmooring of a broader exploration on the potentials of fringes and the unsteadiness of landscapes, material traces and heritages as fertile ways of revealing alternative histories and temporalities in the contemporary Indian Ocean world.

The Indian Ocean is a territory of intersections between people and goods, flows and obstacles, wet and dry climates. While stable cartographies are drawn upon lands, histories in the ocean (Pearson, 2003) invade hinterlands through diverse materialities and hybrid locations. The contact between water and land 'unfolds' (Bremner, 2013) in diverse coastal landscapes, from vast backwaters to rocky and deserted cliffs, as aesthetic reverberations of the possibilities of integration and dissolution of the two elements, land and sea. Cyclic tidal and water movements disrupt the presumed immobility of cartographies, cyclically adding or subtracting territories through water movement. Port towns decline after estuaries become silted and coastal regions change dramatically over time. Looking at how ecologies of the monsoon (Ansaldo, 2009) act on coastal and cultural landscapes offers a beneficial methodology. The recognition of the instability and fluctuation of coastal land and waterscapes can produce perceptions of time, porosity and movements of amplification or contraction as conceivable cartographic templates. I propose to look to some of the Indian Ocean coasts with an affective care for their details: the undrawable maps of the ocean reaching the land and the material and sensorial gradation of monsoons and currents, erosion and sedimentation, silting and evaporation. What are the epistemological consequences of interrogating the modes of ocean 'soak' (Mathur and da

Cunha, 2009), the material world that flourishes on its shores, or paying attention to chromatic settings and the transformations of landscapes over time?

In this essay I explore three locations of the western coast of India connected with maritime trade in the Indian Ocean: The Cambay Bay, the island of Diu and the coastal state of Goa. Through visual experiments made with collages of images and maps in gradations of scales and terrains,[02] I contemplate the ocean from the perspective of hybrid coastal topographies: mangroves, muddy or shallow waters, marshlands, paddy fields, safe harbors, bays, beaches and cliffs.[03] It is the contact, symbiosis or divergence between water and land that explains that certain places became sites of intersection between rootedness and maritime elsewheres (Meier, 2016).

The cartographic gestures of surveying and mapping can be applied to the intertidal surfaces, opaque waters of mangroves and cyclic interventions of the monsoon on coastal regions. The three locations I examine are all constituted by degrees of dissolution of the soil into the sea and vice versa. Cambay Bay is known for its dampened coast and changing shores, sensed through its flat horizons and widespread estuaries. These enabled the establishment of port towns, but also the silting of riverbeds. The island of Diu can be understood as diverse grades of solidity: from the rocks where the fort stands to the cyclically flooded saltpans that almost connect the island with the mainland. The area of the island contracts and expands depending on whether we integrate or exclude these volatile tidal areas in conceptualising or mapping it. In Goa, the landscape is crucial for the construction of spatial and social realities, with white churches and temples built to be visible across extensive paddy fields or marking fertile lands and water sources amid forested hills. The Catholic conversion embraced a much older form of spatially grounding deities to the landscape.

Following the intimate connection between space and society, looking at imprecise places that are both part of oceanic routes and firm land cartographies, takes us to the fringes of social structures and narratives that became silenced in archives and historical accounts.[04] Landscape, if conceived as an archive, inspires us to search for 'muddy' documents, to pay attention to the 'tidal' aspects of historic events and to the 'silting' of statistics or political intentions over time. Landscape and archive, both often overlooked in hybrid regions, questions notions of centers and peripheries, of land and island-ness (Gupta, 2010) and reveals entanglements between a plurality of localized phenomena and cosmopolitan elsewheres (Lionnet, 2011).

Cambay: The Bay and the Ports

Cambay Bay has been a region of historically important port towns in the Indian Ocean world for centuries. It became one of the centres of maritime trade in Western India from the end of the first millennia and has witnessed the establishment of an extraordinary diversity of communities from all continents. The Bay is punctuated on the west by the old ports of Bhavnagar and Ghogha, on the north by Cambay, and on the east by Surat and Bharuch.

We can read the region as a sequence of transitory estuaries where rivers flow wide during the monsoon and opaque seawaters modify the coastline in diffuse gradations of soaked soils. Time is a layer that maps

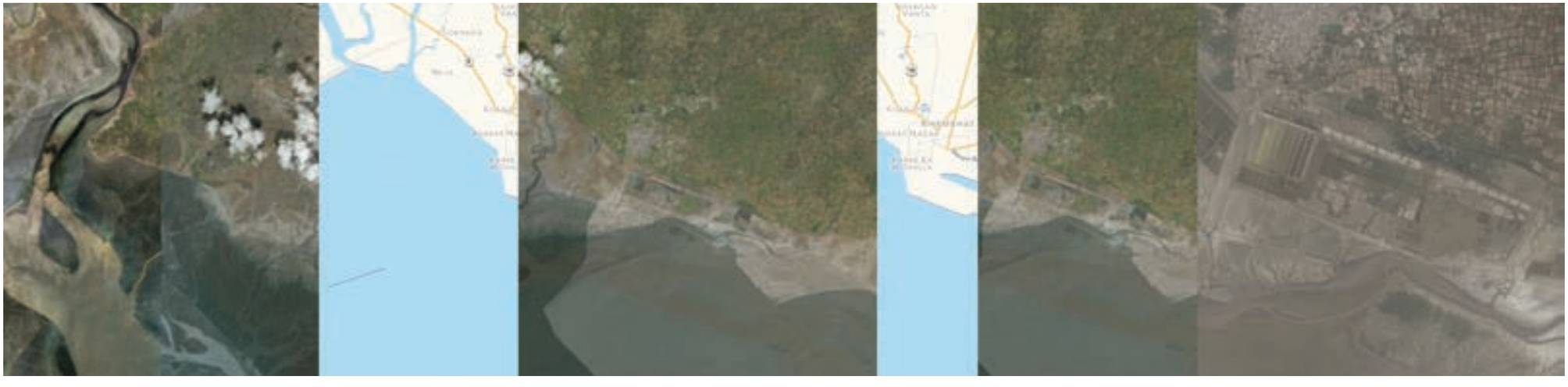


Fig.01 Cambay Bay. This image reads from the larger estuarial waters, on the left, to the contemporary distance between the ocean and Cambay's urban centre, on the right. Pedro Pombo, 2018. Data: Google, Airbus, DigitalGlobe.

commonly do not represent, but for this Bay it has been an essential element of its geography, since the silting of the navigational channels resulted in the port towns becoming further away from the seafront (Chaudhuri, 1985). Being frequently located at the junction of estuaries and the ocean, port towns suffered the influence of both hinterland and maritime climatic systems. On the monsoonal Indian Ocean this meant that port towns became material traces of the interweaving of salty and sweet water, ocean and river, coast and hinterland or sky and soil. The ocean made possible long distance travel while rivers and backwaters took the sea far inland and brought the hinterland to the coast.

(Fig. 01) suggests the impossibility of representing in simplified maps the muddy extensions that result from low and high tidal movements and the gradual occupation of land that surfaced from the constant silting of Cambay's waterfront. As the coast receded, new agricultural fields occupied the lowlands. (Fig. 02) experiments with differences of visualisation and representation of unclear landscapes, where soil not solid enough to be considered land and water not deep enough to be considered ocean. Bhavnagar and Surat, historical harbour cities on opposite margins of Cambay Bay are surrounded by a landscape of lowlands and muddy terrains. The silting of the old coastline of Bhavnagar, to the north and east of Cambay is now being used for saltpans (in the first two images on the left), while the flood plains of the Tapi River and its estuary, southwest of Surat, slowly move the city far inland (on the right). In both cases it is clear that we can't rely on linear maps to understand the incertitudes of landscapes that vary with tidal and monsoon processes. When we look close enough we can understand how urban spaces of the Bay of Cambay were shaped in relation to now absent waterfronts. The water receded but the historical urban grids remind of a past that has not completely vanished. Urban cores and heritage built because of the ocean became the remains of a maritime past that still informs the present.

Diu: of stone and salt

After traveling south and crossing the bridge from the peninsula of Ghogla we reach the small but famous island of Diu, which lies almost at the southern tip of the Saurashtra peninsula in today's Gujarat. Today a part of the Union Territory of Diu and Daman, its relevance in the maritime trade justified its conquest by the Portuguese in the sixteenth century, becoming one of the strongholds of Portuguese empire in the subcontinent until its economic relevance steeply declined at the end of the nineteenth century. Once inhabited by a thriving ensemble of many different trading communities, the island still incorporates traces of its cosmopolitan past in the architecture, commercial establishments and life stories that recall the intense connections it made with the East African coast. The landscape of the region contrasts with southern India's green coastal belt, as it lies at the eastern end of the dryer coastal landscape that marks the Indian Ocean shores from South Asia to the East African Swahili coast. In fact, the sensorial aspects of the seascape and its shores locate Diu at the Western inflexion of the Bay of Cambay while also directing us towards the Western regions of the Indian Ocean.

The island of Diu is a small but productive example of the need to rethink the parameters that sustain our understanding of particular territories. Partially filled with saltpans and mangroves, the northern area of the island is a volatile mass of land and brackish waters, depending on the tide and the alternating of dry and wet monsoon seasons. (Fig. 03) reflects on the territory of the island. The left image is a Google earth image of the island. On the right image a blue traced area covers the lowlands that are cyclically flooded and reclaimed, shrinking or expanding the island. This marking of non-solid, non-firm territory gives visibility to a zone that is dismissed as a reason for Diu having been a central port city for centuries. The wetlands provided a shallow sea bottom slowly deepening to the east of the Ghogla peninsula, to the northeast of the

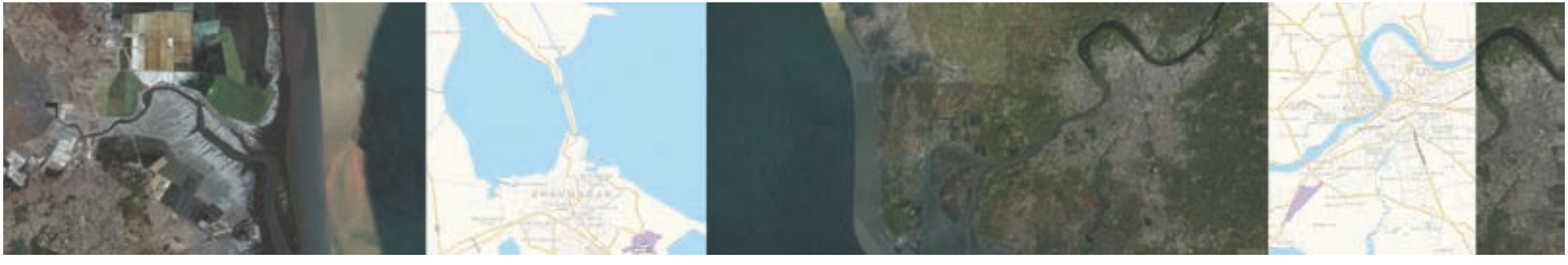


Fig.02 Bhavnagar and Surat, historical harbour cities on opposite margins of Cambay Bay, became surrounded by a landscape of lowlands and muddy terrains. Pedro Pombo, 2018. Data: Google, DigitalGlobe, Terrametrics, Landsat/ Copernicus.

Fig.03 The lowlands of Diu island: on the right, blue lines mark the difference of territory if we count the lowlands as part of the map. Pedro Pombo, 2018. Data: Google, DigitalGlobe, Terrametrics.

island (visible on the top of both images), providing good conditions of safe harbouring for long distance vessels.

The old Diu town is defined by an architecture of geometric forms, elaborated stone balconies and carved wooden doors, an aesthetic language that is rooted in this place but equally echoes, and is echoed by, the Swahili architecture on the Western shores of the ocean.[05]

If architecture is deeply connected with the environment, how to rethink art history and aesthetics taking into account the landscapes that informed modes of living and creating? One possible way can be sensing the chromatic peculiarities of a place. If the binary of land and water, and their encounter, can be multiplied in shades and gradients of material states from the liquid sea water to the muddy man-grove soil or to the crisp salt crystals from the saltpans, unconventional maps can include chroma-tographies to register how built environments enter in conversation with the natural context through textures and colours.

(Fig.04) is a travelogue from land to sea through chromatic shades and materialities of blue. Blue dim-light home spaces, cobalt and turquoise tones on columns and stucco decorations, the intense blue of old doors and their carved frames, small and big surfaces, bluish ice to conserve the catch of the day in the fishing village of Vanakbara on the West end of the island, fishing boats, sky and the ocean. Cartographies drawn with colour instead of lines, as a possibility of representing Diu island in a way that reflects its qualities and its history.

Goa: submerged ports and estuaries

Landing in Goa during the monsoon is an unforgettable experience. Suddenly the heavy clouds open space for a clear view of the mirroring waters flooding the lowlands and paddy fields that define the coastal landscape of the region. The water spreads in curvilinear paths from the hinterland to the ocean; the expansive Mandovi and Zuari rivers are anchored by promontories as entrances to long and wide estuaries, the salty seawater mixing with the cool river currents. While Old Goa (at the Mandovi river bank) signals the place when deep sea and land congregated for centuries, Mormugão port (at the Zuari river mouth) corresponds to the contemporary age, with its infrastructures for large-scale container shipping. While these two centres of oceanic activity remain visible, the eleventh century port of Kopakapattana, also called Govapuri, the ancient Kadamba dinasty's capital that was later conquered by the Vijayanagara empire and the Bijapur sultanate, have slowly disappeared, submerged by the Zuari estuary and mangroves. Remains of the harbour waterfront are still visible during low tide, as if the riverine water has found a poetic mode of evading the permanent erasure of what it submerged long ago.

(Fig.05) is a visual essay of the sensorial features of this encounter between water and soil in the Goan landscape. The porous and chromatic levels of the landscape are visible in satellite imagery of one of the northern effluents of the Zuari estuary. These are combined with

Fig.04 The color blue is the line tracing a chromatic map of Diu town and its oceanic landscape. Pedro Pombo, 2018.

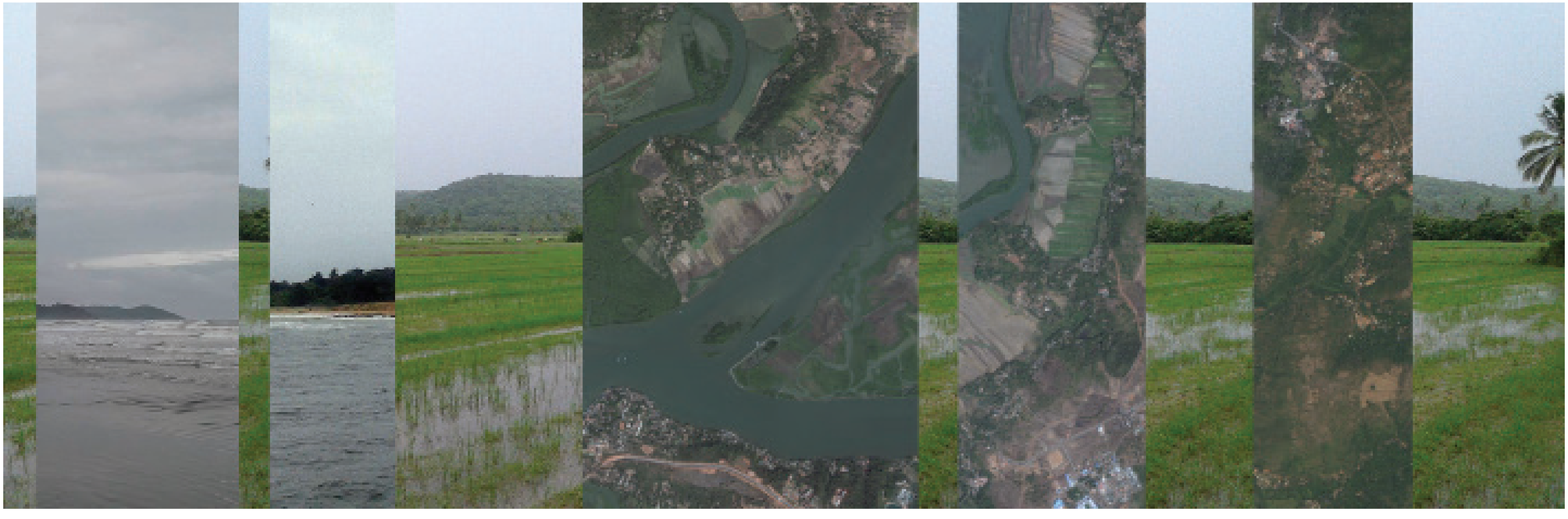


Fig.05 Grading of water embracing land in the Goan coastal landscape. Pedro Pombo, 2018.
Data: Google, DigitalGlobe, Terrametrics.

photographs of the mouth of the Chapora river and rice fields in Siolim village, North Goa. Solid rock, shallow river water, cultivated paddy fields 06 and wild mangroves provide the layers through shades of green, blue and brown, mixing with the heavy greys of the monsoon sky. This collage intends to reflect the monsoon. Water invades every space and surface in all possible states: humid air and pouring rain and flash floods, mangrove muds or intrepid waves that consume the beaches. This is Goa during monsoon, and this is the context that peasants and fishers, sailors, traders or monarchs, administrators or missionaries, had to adapt to. Cities and ports were built taking into account the landscapes and waterscapes that opened paths beyond the Western Ghats and across the ocean; villages occupied riverbanks and reclaimed land for cultivation; temples and churches were erected using the landscape as a spatial template, inserting viewscapes in their own sacred spaces.

Mnemonic coastlines

Coastal landscapes soak different kinds of water: the monsoon, rivers and the ocean. While referring to the Swahili coast, Prita Meier (2017: 355) affirms that 'monsoons, long-distance commerce, and even faraway places are not just symbolic imaginaries but very much the physical matter of life.' I would like to transfer this idea to the locations discussed here. This physical matter is simultaneously the landscape, the materialities that coastal port-cities have produced and the monsoon waters that cyclically affect them.

In keeping with Isabel Hofmeyr's (2012) proposal of looking at the ocean as a method, I would like to look at the effects of monsoon on coastal places as mnemonic archives where history sediments in structures and things that are literally immersed or revealed by the natural elements. The monsoon has the power of washing away a-historic rhetorics, ideologies and projects. The cycle of time is not a repetition but a repository of subtle (and sometimes violent) layers of change that will slowly and persistently transform the coastline and its occupation. Silting and other monsoonal consequences did not only affect historical port cities but keep on affecting contemporary port structures that need concrete wave breakers or systematic dredging. There is a constant need of readjustment to variation and sedimentation, and the effects of the monsoon on coastal aquifers and soils become witnesses to history, which can be unveiled in novel archaeological approaches centred around these soaked and nonlinear landscapes.

The monsoon therefore is history, archive and witness and can be approached as a component of culture, memory and aesthetic sensibilities. It shapes architecture in steeped tiled roofs and verandas; it is embraced in cultural landscapes; it enables circulation, and thus can be understood as a spatial template and inspiring artistic expressions and sensorial relations with the environment (Gupta, 2012). Monsoon rains moisten the outside air and home spaces, books kept in bookshelves gently accommodate the extreme humidity in curving pages, while furniture and textiles unhurriedly gain a particular scent of mould. Outer walls flourish with vivid green moss and in drier regions, as in the Cambay Bay and at Diu, the monsoon rains transform the brownish landscape into an array of green tones while wet terraces cool the houses and creeks become short-lived lagoons. Monsoon is air, water and smell, is texture, sound and colour, movement and immobility. And it is all this in an affective manner, stimulating to almost an extreme the inner qualities of the places it touches.

The visual essays presented here aim precisely at reflecting on the potential of the monsoon and its relations with the edges of the ocean to build inquiries that dilute dichotomies between sea and land, water and soil. We are left with what is not explicitly traceable and demarcated, in order to redraw potential visual responses and map out what can't be expressed and represented through precise lines and measured geographic references.

ACKNOWLEDGEMENT

This text was deeply re-written during my stay in Leiden, Netherlands, as an ASC-IIAS fellow in the autumn of 2018. I am deeply grateful to the African Studies Centre, and the International Institute of African Studies and to the colleagues and staff who supported me during this privileged research period.

NOTES

01 The notion of 'traces' as mnemonic materialities has been lately pervading my research interests, and was at the centre of exploratory research on the island of Diu focusing the presence of scattered material and intangible memories of its connections with Mozambique and the Indian Ocean world. See Pombo (2018).

02 The visual essays presented in this text appear as visual interrogations, and were traced during a recent period of focused bibliographical research on art from the African and Asian continents that inquires migrations, the (post)colonial contemporariness and the Indian Ocean. The impactful languages of artistic practices have a growing influence on my own research path and on re-activating my background on art history into dialogues with anthropology and history.

03 Another very seductive and poetic maritime element that is absence of this area of the Indian Ocean is the coral reef. Making the transition between deep sea and land, coral is part of the imaginaries of the South Seas and the Caribbean and has served as a metaphor for circulation of indentured laborers and processes of creolisation (Torabully, 1999). In fact, the coral and the hybrid spaces of the atolls figure in other inspiring reflections on the peculiarities, and possibilities, of insular locations (Hau'ofa, 1994; Gupta, 2010).

04 Alpers mentions that 'one needs also to consider the lands that surround the ocean' in order to understand the idea of an India Ocean world (Alpers, 2014: 10). His insight deeply resonates Pearson's concept of 'littoral societies' (Pearson 1985).

05 Zanzibar's Stone Town is known for the Gujarati carved wooden doors that became part of a Swahili

architectural language.

06 In Goa, these cultivated lowlands, reclaimed land from rivers and estuaries by complex systems of dams and canals are known as *khazans*.

REFERENCES

Alpers, E.A. (2014). *The Indian Ocean in World History*. Oxford: Oxford University Press.

Ansaldo, U. (2009). *Contact Languages. Ecology and Evolution in Asia*. Cambridge: Cambridge University Press.

Alpers, E.A. (2014). *The Indian Ocean in World History*. Oxford: Oxford University Press.

Ansaldo, U. (2009). *Contact Languages. Ecology and Evolution in Asia*. Cambridge: Cambridge University Press.

Bremner, L. (2014). 'Folded ocean: The spatial transformation of the Indian Ocean world.' *Journal of the Indian Ocean Region* 10 (1): 18-45.

Chaudhuri, K.N. (1985). *Trade and civilisation in the Indian Ocean : an economic history from the rise of Islam to 1750.* Cambridge: Cambridge University Press.

Gupta, P. (2012). 'Monsoon Fever.' *The Johannesburg Salon-Johannesburg Workshop in Theory and Criticism* 5: 71–79.

Gupta, P. (2010). 'Island-ness in the Indian Ocean' In: Gupta, P., Hofmeyr, I. and Pearson, M. (eds.). *Eyes across the Water. Navigating the Indian Ocean*, 275-285. Pretoria: Unisa Press.

Hau'ofa, E. (1994).' Our Sea of Islands.' *The Contemporary Pacific* 6 (1): 148–161.

Hofmeyr, I. (2012). 'The Complicating Sea: The Indian Ocean as Method.' *Comparative Studies of South Asia, Africa and the Middle East* 32(3): 584–590.

Lionnet, F. (2011). 'Cosmopolitan or Creole Lives? Globalized Oceans and Insular Identities.' *Profession*: 23–43.

Mathur, A. and da Cunha, D. (2009). Soak. *Mumbai in an Estuary*. New Delhi: Rupa & Co.

Meier, P. (2016). *Swahili Port Cities: The Architecture of Elsewhere*. Bloomington: Indiana University Press.

Meier, P. (2017). 'Unmoored: On Oceanic Objects in Coastal Eastern Africa, circa 1700–1900.' *Comparative Studies of South Asia, Africa and the Middle East* 37(2): 355–367.

Pearson, M (2003). *Indian Ocean*. London: Routledge.

Pearson, M.(1985). 'Littoral Society: The Case for the Coast.' *The Great Circle* 7(1): 1–8.

Pombo, P. (2018). 'Beyond the margins: place, narratives and maritime circuits in Diu.' *South Asian Studies* 34(1): 33–46.

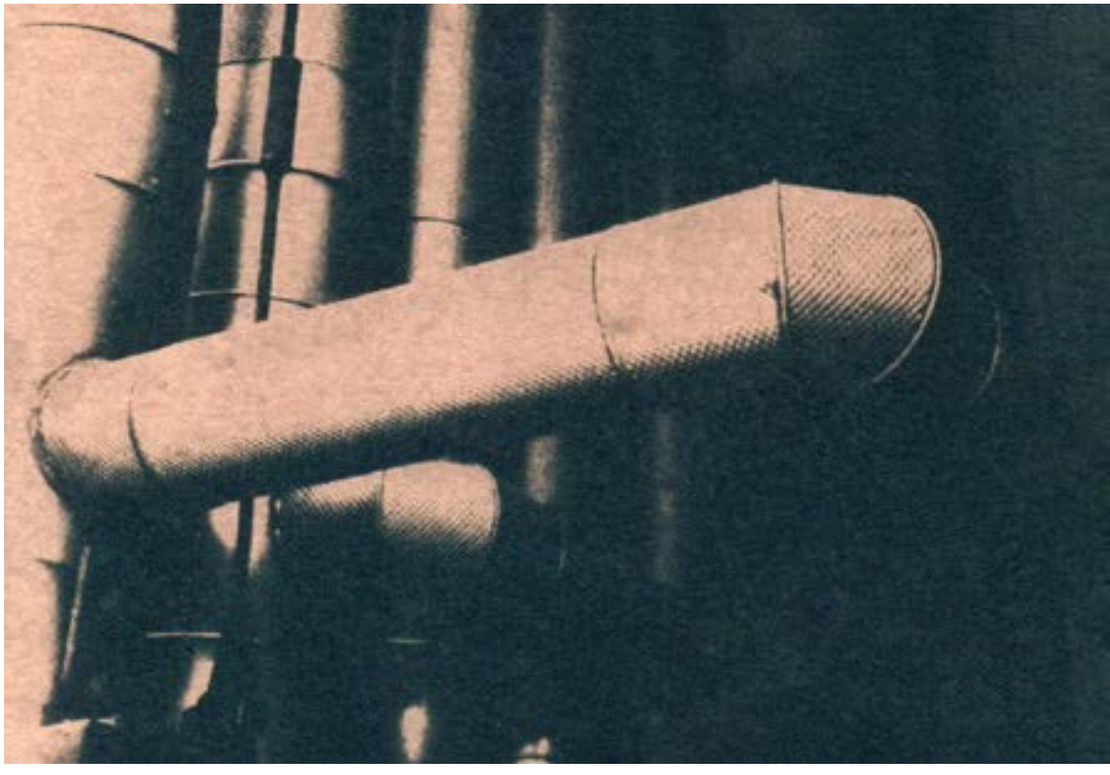
Torabully, K. (1999). *Chair Corail. Fragments Coolies*. Matoury: Ibis Rouge Editions.

CHARTING THE INVISIBLE: WATER, MEMORY AND PHOTOGRAPHY

Carla de Utra Mendes (CM) is a curator and writer based in London. She is a Writing Fellow of the Urban Photographers Association (UPA), and an affiliate of the Lau China Institute, King's College, London, UK. Carla holds a PhD from the University of Saint Joseph in Macao S.A.R., China (as fellow of the Foundation for Science and Technology (FCT) of Portugal). She is a Graduate in Art History, and since her Masters degree, at the Faculty of Human and Social Sciences of Universidade NOVA de Lisboa, she has been focusing on Asian Studies. In the field of contemporary art and museums, she has been a museum and independent curator, educational department co-coordinator, museum educator and independent art critic, having collaborated with institutions such as Calouste Gulbenkian Foundation, Culturgest and Belem Cultural Center (Lisbon, Portugal).

David Kendall (DK) is an artist and researcher based in London. His practice explores how spatial, economic and design initiatives, as well as participatory practices, combine to encourage social and spatial interconnections or dissonance in cities. His artworks, spatial research and collaborative projects have been exhibited and presented at festivals, museums, cultural and academic institutions including: The British Library, UK, the Jüdische Museum Berlin, Germany, Centro Cultural Manuel Gómez Morín, Santiago de Querétaro, Mexicó, Tate Britain, UK, Akademin Valand, Sweden, Universidade do Porto, Portugal, The Photographers' Gallery London, UK, Culturgest, Portugal and the University of Oxford, UK. He is a visiting fellow within the Centre for Urban and Community Research, Goldsmiths, University of London, UK. www.david-kendall.co.uk

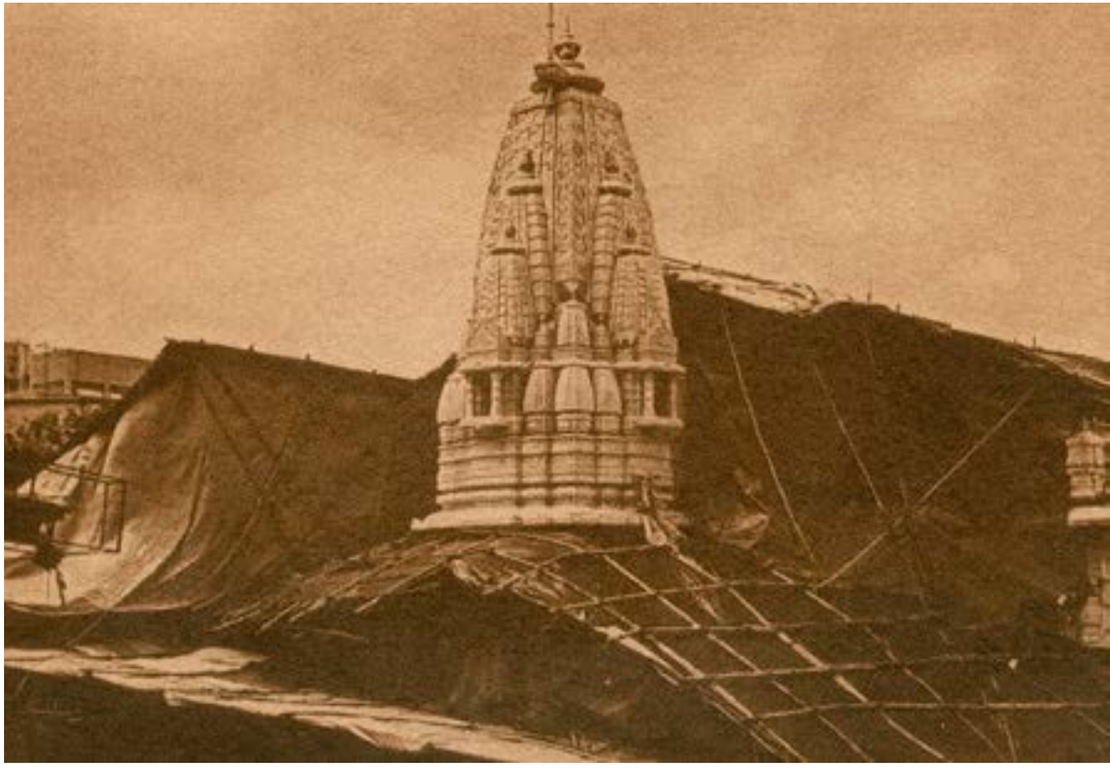
Vrinda Seksaria (VS) is an architect at Studio Mumbai who simultaneously works with alternative photographic methods at her studio, Light Matters. Her work explores links between architectural-urban studies, socio-cultural research and photographic practice, with a focus on cultural archaeologies of urban space and the politics of architectural memory, construction, demolition and decay. Seksaria graduated from the Faculty of Architecture, CEPT University, Ahmedabad, the University of Mumbai, India and the Department of Sociology, Goldsmiths, University of London, UK. She is a visiting lecturer at Sir J.J. College of Architecture and The Kamla Raheja Vidyanidhi Institute for Architecture and Environmental Studies (KRVIA) in Mumbai, India. www.urbanphotographers.org/members-vrinda-seksaria



David Kendall, London, UK © 2017

David Kendall, London, UK © 2017

Vrinda Seksaria, Mumbai, India © 2017



Vrinda Seksaria, Mumbai, India © 2017

Carla de Utra Mendes (CM): Professor Vic Seidler of Goldsmiths, University of London reminded me of the relation of water to memory and in particular resonance to works such as yours in this particular collaboration. How do you see that relation as reflected in both your practices, between memories, places and images? How does this connect and to the idea of 'monsoon assemblages'?

David Kendall (DK): The exploration of collective memory is a key conceptual component and reflective methodology in our collaboration and exchange. As a result, climatic conditions and everyday life merge in relation to our shared cultural recollections of weather and architecture and their relationships to London and Mumbai. Water and buildings combine to generate images that evoke interactions between scale, location and time. Our project dialogue continues to realign and reassemble through these processes and materials. Therefore, an unfamiliar landscape of distance and change exists inline with the dissemination of the work. One might say that due to geographical differences in time across continents the artworks are perpetual memories (and assemblages) that evolve through curated exhibitions, publications, conferences and symposia.

Vrinda Seksaria (VS): Memory is whatever survives from the past as present experience, not something shaped by will or desire but only what is left over from the great passage of time. Here the rainwater contaminated with various impurities specific to the region carries in it memories of places and leaves its unique trace on the print as an archaeological mark. The artworks are a series that performs and reveals linkages between place, memory, weather, politics … And therefore, aligns with the idea of monsoons assemblages.

CM: How is this idea of collection (of the water, of places and of memories) connected with the idea of photography in your work?

VS: The most commonplace idea of photography is of its role as memory. A photograph is never made of something you want to forget. I'm influenced by Susan Sontag's and Walter Benjamin's concepts of 'the photographer as collector' (Sontag, 1977:1; Benjamin, 1999: H1a). In our project, the idea of collection connects with photography through concepts of trace and aura. These ideas were explored through the medium of developing and processing the photographic prints i.e. rain water at the location where the photos were produced. I photographed in Mumbai (India) and David in London (United Kingdom).

DK: Our collaboration considers how collective cultural memory intersects with notions of shared photographic history, methods and mediums. Layers of mutual architectural history form collective and subjective exchanges between us. These connections intersect with selected sites, and climatic conditions in both the United Kingdom and India. Therefore, the rainwater is the substance that links geographical space, materials and reprographic processes (i.e. Analogue photography, waxed paper negatives and inkjet printers) to the built environment in both cities.

CM: And how is resonance – through the idea of water and monsoon – connected to your collaboration and, simultaneously, to each specific process?

DK: This work was made for the London exhibition 'Charting the Invisible,' 10-15 November 2017.[01] We had a five-month deadline (June-October) to make the artworks set by the exhibition curators.

VS: The collaboration was an active generative process. Initial thoughts of colonialism connecting London and Mumbai, the monsoons, architectural skin, colour and perception were themes shared with each other. Over time the work gained conceptual complexity, enriched with ideas of making blueprints by exposure to sunlight and the collection of (polluted) rainwater to develop the prints, and tea to tone the artworks.

DK: During the summer the weather slowed, extended and halted production in both cities. In London there was a lack of precipitation: heavy rain was sparse which led to lack of water for my production. The collection of rainwater became a strategic activity that enhanced conceptual development in London and Mumbai. These conditions added conceptual layers of intricacy to project development, and the analogue and digital processes used to make the work.

VS: Mumbai prepares for the monsoon with a new skin of blue tarpaulin covering permanent and temporary structures across the city. We went ahead and photographed in our cities, and I collected the rainwater as we'd planned. However, I had counted on fair weather in October to make my prints, but a wet spell caused delays. I grabbed any sunny interval to work, to test and make prints. Each one was different in tonality and unique in its own right as they had weather patterns ingrained in them. The prints are unique: un-editioned and unrepeatable. If the fair weather window had not opened and the rains continued, the prints could have been made in a light box. However, this process would take away the integrity of working with the environmental conditions: rainwater, sunlight, time, weather and climate.

CM: How do you consider the connection between two very different, (contradictory some may say), elements of nature versus technology, of water versus electricity while, at the same time, the photograph is a result of natural elements such as light. In other words, how do you establish the connection between light, water and technical apparatus, solid and fluid in the constitution of a photographic image?

VS: We've used a historic and alternative photographic printing process called the 'cyanotype' to make the prints. These have been made by contact printing with a digital negative, exposing a chemically coated watercolour paper to sunlight for the required duration, and processing the print in collected rainwater on location with all its impurities. The blueprint made is then toned with tea water also made with collected rainwater. Historically architectural blueprints evolved from the cyanotype process, rendering shared history via architecture.

DK: Climate and precipitation are significant elements in producing global collaboration between us. The environmental conditions and polluted materials in the two cities: monsoonal water, tannins, digital and analogue reproductive technology created shared concepts and materials. These resources are used to compose, form and influence the evolution of the printmaking, and as the prints develop overtime their tonal appearance reacts to UV light, rainwater, polyphenolic compounds and oxidation in the sites where they were made and exhibited. New spatial conditions are generated: revealing segments of the historical and geographical residue of empire that still exists in the social and cultural values of India and the United Kingdom. It is the through the materials and their composition that we can gain insights into the artworks symbolism and meaning.

VS: Blueprints have conventionally been used to make copies, but here the technical apparatus of sunlight and rainwater has imprinted a unique original that has conceptually and literally become the photographic image. The photographic prints are completely ingrained with their geography of space and time. Weather patterns, pollution, time, light, power structure etc. were the unregistered visual elements in the image. The photographic images are not documents in need of deciphering, but symptoms of the world they portray.

CM: Is spatialisation or, rather, the location of the image determinant in a world of digitalisation of reality? How is that spatial practice connected to the monsoon phenomenon?

VS: The Indian summer monsoon is the strongest monsoon system in the world and deeply etched into the socioeconomic fabric of the region while also leaving an indelible imprint on global climate and general circulation. Apart from determining the water and food security of the region, it also significantly controls the overall economy. The water footprint of Mumbai is said to extend to five times its juridical boundary and this is entirely dependent on the monsoons. On shorter timescales, floods and droughts resulting from year-to-year variations of the relatively stable monsoon cause death, destruction, and misery. While major shifts in monsoons have apparently shaped the rise and fall of civilisations as well.

I am an architect who believes in contextually appropriate work – any form of spatial practice should be attentive to its environment, the materials, the inhabitants; in short, it's milieu. It has to be inclusive. The consideration and attention to elements of sun, wind, rain, land, even history is intrinsic to space. These concerns transfer into photographic practice as well: photography is writing with light after all.

DK: In the United Kingdom, climatic conditions are often predictable and stable – extreme weather patterns are rare, such as the hot and dry Summer in 2018. Consequently, climate can become a perceptual concept culturally reproduced through mobility, memory, space and time. These are themes I explore in my art and photographic practice. I have learned that working in the different climates around the world, in high and low temperatures not only affects atmospheric social conditions on the ground, but also slows down or speeds up the internal mechanics of digital audio-visual devices sometimes producing unpredictable spatial visualisations and unfamiliar technological results. Thus, spatial composition, sequence, tone and hue are important in the production of the picture series and underwrite technical and chemical relationships between colour, narrative and terrain in my artworks. These ideas have influenced conceptual frameworks in our collaboration and how 'water' is culturally perceived and physically embedded our project.

CM: You also explored the idea of colonialism between two very different locations. In your opinion, how can we establish thinking in these parameters with the idea of resilience and corrosion?

VS: Colonialism is both the most obvious fact about Mumbai while also producing the most elusive effect. The colonial past of Mumbai is inscribed in its built and human fabric. This past is rebuilt, refurbished, commodified, and even celebrated in different forms, through the state apparatus, architecture, sport and language.

The dichotomies (of centre/periphery, self/other, class, caste, religion, colonised/coloniser) created by the colonisers as an attempt to record and classify Indians went hand in hand with the material and spatial practice of surveying, mapping and possessing the land.

A lot of the monumental colonial structures in Mumbai are being conserved and hold a heritage status. The visual representation of these built memorials emphasise sites of memory as acts of reconciliation with the past. However, in the monsoons you'll find them draped and wrapped in a blue tarpaulin skin: a sign of the temporary city. The structures may have been weathered but hold up with a new skin for the four monsoon months, trying to brave the crisis of climate change. This is seen across the city, sparing none of the buildings.

DK: This ongoing project aims to reconfigure geopolitical and perceptual links between the two cities. The artworks investigate how temporary and permanent architecture, and the evolving skin that covers cities generates co-production and dialogue through image making. As a result, our exhibition installation aims to present new cultural exchanges and ocular blueprints affected by the atmospheric, environmental and colonial residue of urban life across continents.

Thus, the reproduction of buildings on existing city sites links the colonisation of India with British financial, corporate control and urbanisation. These architectural sites connect geographically through shared social and cultural histories yet are influenced by contemporary global economic and climatic conditions. For these reasons, structural intersections between British colonial corporate history in the City of London and spatial infrastructures and material cultures in India are revealed and explored in the project.

Consequently, I focused on links between the built environment and colonisation in the City of London specifically sites where the East India Company (EIC) developed its business interests in India. I discovered that over time the EIC located its headquarters in locations where current iconic architectural structures stand, such as 122 Leadenhall Street (The Cheese Grater), 1 Lime St (Lloyds of London – the site of the East India House, the last headquarters of East India Company until 1858), 52 Lime St (The Scalpel) and the site of Craven house, in Philpot Lane where the EIC was founded in 1600 (opposite 20 Fenchurch St, The Walkie-Talkie). The images I made come from these locations, I was interested in infrastructural links that form over time and how these architectural sites remain globally significant and iconic centres of international commerce: places that are photographed time after time.

CM: In conclusion, we can also think here of polluted waters, for example, beyond a natural or historical phenomena that is specific to a place. Is the Anthropocene a way to finally erase the dichotomies between centre and periphery, colonised and coloniser?

DK: If one considers the Anthropocene as an experiential and sensory process, our collaborative research is a series of aesthetic actions, an encounter with a range of geological and political histories, and materials. Therefore, the centre and periphery have been removed and reassembled through artistic process and situational praxis. Our image making explores how European architectural histories merge with South Asian colonial structural legacies. In addition, climatic conditions can decelerate or hasten physical interaction or restrict mental mobility in cityscapes. My work is often phenomenological, reacting to environmental and atmospheric qualities, colour depth and intensity of light. This productive tension affects social relations with time and space, and how I perceive and sense spatial and visual perceptions in my work. Climate and topography influence where people live and why they migrate across continents for economic and social reasons. I am interested how colonial technology and nature interact (Davies and Turpin, 2015). The infrastructural juxtaposition of natural elements in the construction and display of the project: sunlight, paper, rainwater and tea are combined with technological and scientific elements: chemicals, inkjet printing, glass and plastic, to question notions of manufactured and natural materiality. Consequently ‘centre’ and ‘periphery’ intertwine. The technical evolution of the photographic medium and the diagrammatic development of architectural and planning processes are influential in how colonial legacies in India and the United Kingdom are represented and remembered. For that reason, the on-going geopolitical situation continues to influence the experiential frictions that evolve between knowledge production and practical structural situations that appear on the ground in London and Mumbai. Therefore, these approaches to practice have influenced my collaboration with Vrinda and therefore our collective work. Photographic art is a creative medium to investigate how these factors contribute or not to dichotomies generated by current debates about the Anthropocene. Vrinda might have different viewpoints.

VS: Thank you David, for the Anthropocene to have real value as a category of thought and a call to action, it must integrate people and places, not just link disciplines. One critique of the Anthropocene is that it attributes ecological collapse to an undifferentiated humanity when in practice both culpability and vulnerability are unevenly distributed, and must be overcome through politics and solidarity. As I stated earlier the dichotomies of centre – periphery, self – other, class, caste, religion, colonised – coloniser are outcomes of commerce and influenced by the shared colonial history of India and the United Kingdom. As David points out architecture, materials and climate geographically link our artworks to shared European and South Asian social and political histories. Photography and the built environment have generated records that classify contemporary Indian identity hand in hand with the material and spatial practice of architecture, surveying, mapping and land possession.

The differences in rich/poor, coloniser/colonised, modernisation and its inherent inequalities are minor when compared to the ecological extent that humankind’s existence is challenged (Emmett and Lekan, 2016). If we need to come to terms with contemporary climate change, we probably need to look through other lenses besides colonialism and capitalism. If architects and artists develop experiential and sensory projects exploring the Anthropocene, and its relationships with globalisation: the uneven and inequitous history of world capitalism, and the emergence of global media and technological connectivity are confronted, and social and spatial power relations re-classified through architectural and photographic practice.

NOTES

01 See: https://www.gold.ac.uk/calendar/?id=11146

REFERENCES

Benjamin, W. (1999). *Arcades Project.* Cambridge, MA.: Belknap, Harvard University Press.

Davis, H. and Turpin, E. (eds.). (2015). *Art in the Anthropocene: Encounters Among Aesthetics, Politics, Environments and Epistemologies.* Open Humanities Press. Available at: http://www.openhumanitiespress.org/books/titles/art-in-the-anthropocene/

Sontag, S. (1977). *On Photography.* London: Penquin.

Emmett, R. and Lekan, T. (Eds.). (2016). 'Whose Anthropocene? Revisiting Dipesh Chakrabarty's "Four Theses."' *RCC Perspectives* 2. Available at: http://www.environmentandsociety.org/perspectives/2016/2/whose-anthropocene-revisiting-dipesh-chakrabartys-four-theses

CHRONOS AND KAIROS: TIME, WATER, MEMORY AND THE WAYFARING RIVERBANK

Mary Gearey is a Senior Research Fellow in the University of Brighton's School of Environment and Technology. She undertakes empirical, qualitative field work to explore the relationships between practices of community resilience and water resources policy, planning and management in the context of sustainable futures.

Introduction

Landscapes are both material presences and creations of our cultural imaginations. When we inhabit landscapes we experience both their unique, immediate physical aesthetics and recall other times, other places, other selves that these places bring to mind. We experience the confluence of *Chronos* and *Kairos* time; two key concepts in theology and philosophy. *Chronos*, slow moving, seasonal, predictable, chronological time and *Kairos* - the auspicious, critical moment in which impactful episodes occur which shape key experiences and define life's formative events. Like circulating water, shifting tides, *Chronos* and *Kairos* time are the ebb and flow of our sensory experiences through life, shaping ourselves and marking out the events which define who we are and how we live with others. A landscape which is resonant of *Chronos* and *Kairos* time is that of the riverbank. At once bounded, defined, known, yet continually in transition, being reshaped, remade, through the erosion and deposition action of the water which demarcates them, riverbanks, like the communities and people that live adjacent to them, are constantly in motion, wayfaring across landscape and time, in processes of adjustment and redefinition. Utilising empirical fieldwork undertaken in collaboration with a local community sheltered under the spine of the South Downs in a village which is hallmarked by chalk streams, hidden sewers, peripatetic springs and dew ponds, this chapter explores how the act of recreating a riverbank in the midst of urban fabric is both a cultural and political act. The 'riverbank' is a residential road on which a downland spring makes its journey from Chanctonbury Ring to the River Adur. Over the years and generations, village children have played here, sailing handmade paper boats and racing dandelion faeries along the spring, bringing the riverbank to the heart of daily village life. Recently though, changing land-management practices on the downland quills and the impacts of local government austerity measures, have altered the flow of the spring, causing it to billow and flood the road. The spring's shape-shifting dexterity has altered to something more sinister, with the riverbank submerged, buckled and broken by the water. Working in tandem with local residents, the research presented in this chapter explores these changes over time to see how cultural practices, community aesthetics and political solidarity unite around this wayfaring riverbank to work towards returning the spring to its formative place in the heart of

community life.

The wayfaring riverbank

Rivers have multiple identities. They act as physical and political boundaries in administrative regions; they provide irrigation water for agriculture and act as fluid highways for drinking water storage and transport, effluent dilution and nutrient distribution. Traditionally rivers were, of course, essential for economic development for trade with population hubs developing around ports and harbours. Rivers provide food and other resources. They are physical, tangible entities captured on cartographic maps, aerial photographs and satellite images. Rivers are revered, worshipped and are the foundations for religious, cultural, social and national identities. When we close our eyes and think of a river we can all call to mind both rivers that we have known, both urban and bucolic, others, more viscerla, teeming with activity and industry. Yet we also have the rivers of our imagination, created through childhood storybooks, romanticised art, a longing for something magical, pure and 'natural'. These are the rivers of our imagination; part creation, part reconstructed memory, part snatches of beauty which we keep deep within ourselves.

Yet these strong riverine presences within our landscapes which we try to capture and fix in time through photos and mapping and nclude within national and local planning, policy and law making, are also always on the move. This is true not just of their water component but true too of their riverbanks. They undergo soil erosion and deposition. Riverbed agglomeration and extraction both natural and human-made changes turbidity and sediment movement rates. Suspended nutrient loads move resources downstream impacting on vegetation and animals. Rivers move. change their shape; bulging at some points, sinuous and tendril like in other spaces. Rivers deepen and become shallow; increase turbidity at some points and become more sluggish at others. New life inhabits these emergent riverine shapes and flees from others. Land use change impacts on chemical concentration, riverbank compaction, tree shade and water temperature.

Rivers are also sub-surface entities. Underground rivers, streams and springs find their way through different soil types and rock strata; recharging porous aquifers, carving out karst landscapes and causing above ground water sources to appear, disappear and reappear at different times of the year and in spatially different sites year to year. Running counter to disciplines and professions that rely on predictability, many different types of land use developers have experienced to their chagrin the presumption that water can be a reliable, fixed resource, treated as a known and organised hydraulic commodity. Farmers find wells dry up, building developers discover springs running through new houses, local councils are called to respond to eroding highways.

This mobile, fleeting, often surprising, appearance of surface water forms is both an outcome of regular subsurface and surface water flows but can also be a response to flooding events.

Flooding is, of course, a natural part of the hydrological cycle. It is also a component of human-nature co-relationships. As a result, we have moved through different human constructed paradigms to understand, describe and attempt to direct these co-relationships around flooding. The current dominant paradigm is that of flood risk management: that flooding is inevitable, and that our built and natural environments need to be sensitive to greater variability in water flows. It is possible to say then that water's tendency to appear in inconvenient spaces reminds us of our human imprints upon the earth's surface. Our rational choice to build infrastructure close to water resources, both surface and sub-surface, means that there is always a chance that our homes will at one time or another become ephemeral riverside properties (Fig.01). Riverbanks are wayfarers: over time and space they change location and visibility.

Chronos and *Kairos* time

This physical mobility of water in our landscapes punctuates our life's experience of being both in natural and built spaces. When we inhabit landscapes we experience both their unique, immediate physical

Fig.01 Winter floods, Bramber village, West Sussex, UK, 1925. Courtesy of the Beeding and Bramber Local History Society.

aesthetics and recall other times, other places, other selves that these places bring to mind. *Chronos*, slow moving, seasonal, predictable, chronological time and *Kairos* - the auspicious, critical moment in which impactful episodes occur which shape key experiences and define life's formative events. Like circulating water, shifting tides, *Chronos* and *Kairos* time are the ebb and flow of our sensory experiences through life, shaping ourselves and marking out the events which define who we are and how we live with others.

These *Chronos* and *Kairos* timelines intersect, run parallel, create abrupt erasures and redirections. *Chronos* provides us with balance and stability; it is knowable, predictable and reassuring. If we return to the analogy of the riverbank, *Chronos* is the riverbank of our childhood which it is always possible to return to and revisit. Yet memory can be fickle. As we age we can remember a riverbank in an idealised or even hyperreal perspective, fixed temporally with our experiences of a past time and resultingly located in memory as a semi-fictionalised reality. As will be shown in the empirical fieldwork section below, this creation of a *Chronos* memory provides us with assurity and a motivation, either to assert or reject this reality both internally and with others. We shape our sense of self with these long term memories and, as the fieldwork analysis will argue, often make *Kairos* decisions based on these personal, fixed, perspectives.

Kairos time represents the ruptures and about turns that we all experience in life. Some *Kairos* events are catastrophic, and uproot life's trajectory. Other *Kairos* events can be viewed as serendipitous; a chance event which enables a whole new positive phase of life. Often both can happen at once – and only through the *Chronos* long-term perspective can we interpret the *Kairos* events as positive or negative with regards to our life's course.

A landscape resonant of *Chronos* and *Kairos* time is that of the riverbank, so vital to our embodied selves and sense of place, to our collective imaginations. At once bounded, defined, known, yet continually in transition, being reshaped, remade, through the erosion and deposition action of the water which demarcates them, riverbanks, like the communities and people that live adjacent to them, are constantly in motion, wayfaring across landscape and time, in processes of adjustment and redefinition.

As a researcher exploring the ways in which people are connected to their local waterscapes, this link between *Chronos* and *Kairos* time and local water resources is evident through empirical fieldwork. The next section will outline qualitative fieldwork undertaken along the River Adur valley in West Sussex, within the South East of England.

Case study: three interconnected waterside villages in the River Adur Valley

Fig.02 Detail of the River Adur, West Sussex, and the villages of Bramber, Upper Beeding and Steyning. Courtesy of the Ouse and Adur Rivers Trust.

Nestled under the chalk hills of the South Downs are three villages, Bramber, Upper Beeding and Steyning, sited midway along the River Adur (Fig.02). This area is abundant with chalk streams, hidden sewers, peripatetic springs and dew ponds. As a result, water appears in unusual places, sometimes expected and desired, sometimes unwanted: *Chronos* and *Kairos* in contemporary symphony.

As monsoon waters are both predictable and yet still capricious, changing year to year and season to season, so too are the waterscapes of these South Downs villages. Water, filtered through chalk aquifirs, emerges out of the ground in gently bubbling fonts, in slightly different configurations of volume and location, with each successional year. The riverbank in this empirical example is a country lane in the ancient village of Steyning on which a spring makes its journey from Chanctonbury Ring, a neolithic hillfort cresting the Downs, to the River Adur. As it slopes gently towards and through the village the lane becomes tarmacked as it gradually becomes peppered with houses, old and new, reflecting the changing population and economy of this small habitation. The spring,

which ebbs and flows in response to local rainfall levels and indigenous land cover use, is a perpetual presence, but its form and vigour are always in a state of recalibration. The spring in many ways represents the dynamic between human and more-than-human worlds as each responds to and is shaped by the other.

Over the years and generations, village children have played on this roadside spring, sailing handmade paper boats and racing dandelion faeries along it, bringing the riverbank to the heart of daily village life. Recently though, changing land-use practices on the downland quills and the impacts of local government austerity measures, have questionably altered the flow of the spring, causing it to billow and flood the road. The spring's shape shifting dexterity has altered it from a watery playground to something more sinister, with the riverbank submerged, buckled and broken by the water.

My introduction to the wayward riverbank came through my empirical fieldwork in the local area which sought to explore place connectivity through capturing how waterside residents relate to their water assets in a multiplicity of ways; aesthetically, pragmatically, economically, physically, emotionally - amongst others. Through asking local residents to share with me how they view changes in their local water environments; with no caveat on what or how these changes are defined, a multiplicity of anecdotes, anxieties, opinions, shaggy dog stories, disinterest and gossip were exchanged. The shifting spring was just one water resource that was discussed within a range of others - from the local pond where local dignatories like to walk in the early twentieth century, to the black sewer that was a conduit for smuggled items from Bramber Castle - lively discussions were held over whether the River Adur serves its riparians better by flowing fast or slow and meandering. When sharing these tales of history, of intrigue, of hydraulics, the people talking with me are helping to fix not just their local water resources within a spatial and temporal context, but themselves too.

The saga of the spring on this little country lane is emblematic of this. Whilst still used to float paper boats in its slack period, increasingly heavy rainfall events led to the spring billowing, with water cascading down the rutted stony upper stretch. This has scoured the road, eroding the surface and loofahering the tarmac at the lower residential end with the moving debris. Local residents, tired of their car windows and bodywork being abraded by the resulting stones and scree suspended in the water have built driveways to get their vehicles off the road, creating more hard-standing and so more surface water. This situation is compounded by bulky delivery vans directed by their SatNavs to use the lane to access the large farming estate and attendant business centre at the top of the road. Local residents complain of more debris washed against their garden walls and vehicles, leading to increased subsidence and insurance claims.

All of this came to my attention through a local Residents' Association campaign. A small group of neighbours came together to undertake a multipronged approach to tackle this complex issue. They took a more macro perspective of the problem, citing changing land use practices on the Downs and run-off as responsible for less soil retention of water and hence greater erosion. Added to this were the impacts of austerity politics within the UK - reduced resources from local government had led to poorer quality road surfaces which quickly degraded and were less frequently maintained. Fewer council staff, with highways work outsourced to external contractors, led to blocked drains and culverts, exacerbating the billowing surface water. Long gone were personnel with precise knowledge of the hydrology and topographic regime of the lane. Politics, economics and environmental issues collided.

Yet the drive to address the problems were not necessarily driven by those who remember how the spring used to flow. The main contingent of the campaign group are relative newcomers to the village. They have moved to the village to retire – or to enable a slower pace of life. What they envision for the road is therefore part of a wider visioning of the rural idyll; of peace, tranquillity, community. Moreover, these campaigning residents have more knowledge capital and free time to invest in addressing the multiple and dynamic issues impacting on the road. Returning to our consideration of *Chronos* and *Kairos* time, we can see how pertinent these timelines are when we contemplate this wayward riverbank.

Memory and time

For some of the residents, moving to the lane was about enjoying peace and quiet on a country road. Memories of past holidays, of past elders enjoying their retirement - walking the dog, walking the nearby Downs, enjoying comfort and good health after a lifetime's work and sacrifice. The lane is immortalised through a poem now displayed on a roadside plaque. The poem is a loving tribute to the lane written by a serving soldier John Stanley Purvis in the trenches during World War I (Fig.03). It reads:

> *I can't forget the lane that goes from Steyning to the Ring. In summer time, and on the Down how larks and linnets sing. High in the sun. The wind comes off the sea, and Oh the air! I never knew till now that life in old days was so fair. But now I know it in this filthy rat infested ditch, When every shell may spare or kill - and God alone knows which. And I am made a beast of prey, and this trench is my*

lair. My God! I never knew till now that those days were so fair. So we assault in half an hour, and, - it's a silly thing - I can't forget the narrow lane to Chanctonbury Ring.

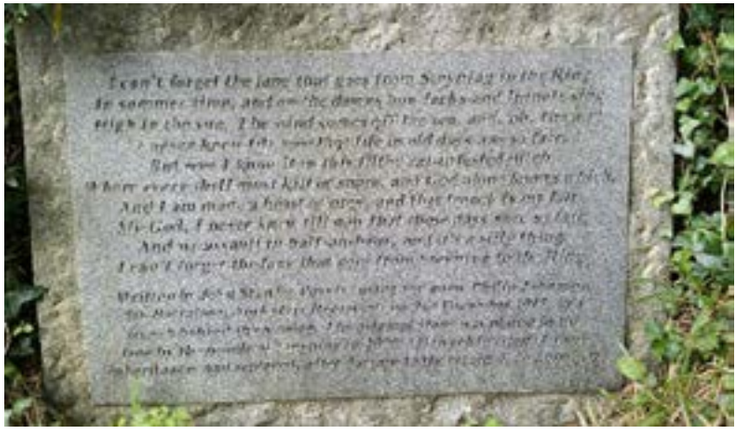


Fig.03 John Stanley Purvis' poem, immortalised along the lane on a stone plaque. Mary Gearey.

The poem directs us to reflect on our imagined space, suffused with longing, and the reality we must address. For the local residents the billowing water becomes the antithesis of this desired *Chronos* continuum. Now the cottage garden is sodden and muddy; delivery personnel refuse to drop off post and parcels; the long imagined and desired bucolic view is besmirched by roaring trucks delivering supplies to the businesses at the top of the lane. From golden years to fuming inconvenience.

One motif that was continually referred to by the residents was the perception of being let down by the government. That after years of being good tax-paying citizens, they were being cast adrift, left to sort out problems that were too knotty and complex for parish councillors, highways agents or local politicians to resolve. Late in life these residents were having a radical political awakening. *Kairos* incidents of immediate concern were disrupting the fabric of *Chronos* time; in fact threatened its complete erasure. What could replace it other than a continual series of anarchic *Kairos* episodes with no possible return to stability? If local governance has broken down and ceased to function, much like the buckled and broken riverbed of the local spring, then what chance of creating a new normality?

And yet. And yet. Whilst talking with me about commissioning engineer's reports and organising culvert clearing days along the road there was a sense of some new energy having been released. As the various residents talked to me of their concerns and actions, over cups of tea in kitchens, poring over photographs and diagrams and leaflets I got the sense of a new community forming. It's very possible that without the wayward river that these neighbours would never have really got to know each other (Stokowski, 2002). Working on a common project that requires trust, hard work, dedication and financial inputs seems to have enabled a strong focus and bond between those really involved in the campaign work. Rather than days of reflection, time is now spent very outward facing - looking at the drivers of the causes of these problems, and leading the residents not only to question local governance structures but also the globalised markets that impact on local land use choices; and of course the way in which more erratic rainfall events can be linked to global warming. (Russell et al., 2013).

This nascent river with its monsoon-like attributes of seasonality and abundance has connected these residents to the outside world, to global changes, in a way which might otherwise have been precluded. The flowing water has provided these riparian debutantes with a reason to challenge existing norms and demand to be part of the change. Though the flooding is still to be resolved, with discussions and compromises ebbing and flowing, at times slack, at other times in spate, this too is important. As the monsoon is a temporal process these domestic issues for the local residents are the syncopated push and pull of the *Chronos* and *Kairos*, reminding them of both their own lives and those of younger generations and those still to come. The connectivity of their lives with others and with global changes is focused on the ebb and flow of this wayfaring riverbank.

REFERENCES

Russell, R., Guerry, A. D., Balvanera, P., Gould, R. K., Basurto, X., Chan, K.M., Klain, S., Levine, J., Tam J. (2017). 'Humans and nature: how knowing and experiencing nature affect well-being.' *Annual Review of Environment and Resources* 38: 473-502.

Stokowski, P. A. (2002). 'Languages of place and discourses of power: Constructing new senses of place.' *Journal of Leisure Research* 34(4): 368-82.


TROUBLED WATERS

WATER LITERACY: CHALLENGES OF LIVING WITH TROUBLED WATERS

Kirsten Hastrup is Professor of Anthropology at the University of Copenhagen. She has done substantial research on Icelandic history and society, on human rights and legal language, on theatre and social action and on the beginnings of Danish anthrpopology in early polar expeditions. Since 2007 she has made recurrent fieldwork in Northwest Greenland. In addition to these more specialised fields, she has published critical exploration of the philosophical and epistemological foundations of anthropology, text books on anthropology, and general introductions to the history of the human sciences and their contributinos to society. Between 2009 and 2014 she led the ERC funded project Waterworlds, which studied local, social responses to environmental disasters related to water, as spurred by the melting of ice, rising sea levels and accelerating desertification.

People across the globe live with troubled waters, being one of the manifestations of climate change. This calls for a rethinking of well-established forms of water literacy i.e. ways of understanding and acting upon water, practically and academically. The unruliness of water, of wetness, and of seasonality results in social upheaval and a need for new spatial practices, as will be shown through an ethnographic case from the High Arctic, where the melting ice forces people to rethink their place in the world. Through this case and comparative cases from the South, some general questions will be addressed. First, the configurative power of water will be highlighted through the notion of water-sociality and its spatial and historical ramifications. Second, the non-scalability of fluid worlds will be discussed as a general theoretical challenge to scholarship, conventionally based on a neat system of classification. Third, the notion of turbulence will be introduced as a productive metaphor for the indeterminacy of landscapes and theories. The conclusion returns to water literacy as an epistemological challenge to scholarship.

Introduction

The notion of water literacy that frames my argument has been nourished by my work with Waterworlds, the name of a collective ERC-research project, exploring the ways in which water configures social worlds. The actual configurations are not necessarily inevitable; they are responses made within a particular social and imaginative horizon. It is this interface between natural and social histories that I have worked to theorise over the years, based on fieldwork in different places – notably in Subarctic Iceland and High Arctic Northwest Greenland. If the Arctic seems far away from the region of monsoons, there is no doubt that both regions are currently troubled by changes of wind, weather and water, and that they are equally implicated in global climate trends.

The Waterworlds focus on water made unlikely regional comparisons possible, so to speak. The group of fifteen people who were part of the project worked in different regions: Pacific Islands, the south-east Indian coast, the Arctic and High Arctic landscape, the Sahel zone, desert Mauritania, and glacier rich South America. All of these regions had manifest troubles with water, there was either too much or too little, or it came at the wrong moment, or in the wrong kind, like water instead of ice, and different kinds of water could be in conflict with each other, i.e. salt- and seawater. Out of the distinct fieldworks and the evolving conversation, a deep sense of the configurative power of water emerged, spurring the question of how to read water to better understand its unruly influence on community life (Hastrup, 2013; Hastrup and Rubow, 2014; Hastrup and Hastrup, 2017).

Another inspiration derives from oceanographers setting up a network and calling for ocean literacy, i.e. a more comprehensive 'understanding of the ocean's influence on you and your influence on the ocean' (www.ocenaliteracy.net). This reminds us of Fernand Braudel's comprehensive analysis of life and politics around the Mediterranean in the sixteenth century (Braudel, 1972), showing how the slow rhythm of rising and falling seas infiltrated political development in the region and how historical conjunctures are embedded in large-scale natural processes, which are not necessarily perceptible within the time frame of lived life.

Other studies from other seas and their coastal fringes equally show how the historicity of the ocean stretches to the farthest corners of the Earth. We know now how Pacific Islands emerged or disappeared as centuries passed by, and how they became populated or depopulated by brilliant navigators following the deep human instinct to move – and as the sea changed, they were stuck (Nunn, 2007a). When it comes to monsoon waters, the sea and the winds are equally partners in the making of history, as are people, who are not only victims of a new kind of unpredictability but also the interpreters; whence the need for water literacy.

Water Sociality: Spatial Ramifications of Life

The discussion takes off from my own field as an example of water-sociality and the configurative power of water. Most will have heard about the dwindling ice due to global warming, and while in some places this may seem positive, in High Arctic Thule it is a major challenge. The sea-ice was and still is the major connector between people and places along the coast, and between people and their prey; now it is less reliable than before, with the sea opening up earlier each spring. The population was always small; today it counts some 750 people, most of them living in Qaanaaq, the main town, and in three remaining settlements.

The sea and the sea ice have been major players in the configuration of the community, ever since the early immigrations from the Canadian Arctic into the Thule region. Once there, people used all available local materials for some purpose or other: Stone for meat-caches and graves, stone and turf for winter houses, skin and wooden poles for summer tents, with stones to keep them in place – still discernible as tent-rings on the stony ground. These materials have been offered up by the landscape; indeed, they belong to it. The stones used also for the construction of stone and turf houses, were plucked directly from the landscape, but often derive from rocks that moved in millions of years ago – a landscape provocation in Massey's terms (Massey, 2005). Wooden poles came with the drift ice and skins were prepared from game of various kinds.

This list of materials is not necessarily surprising, but it is deceptive for its alignment of different materials, omitting their individual historicity. Each 'thing' can be unpacked and put in a separate perspective, showing the vibrancy of matter, to paraphrase Jane Bennett, who wants to 'theorise a materiality that is as much force as entity, as much energy as matter, as much intensity as extension' (Bennett, 2010: 20). To substantiate this, I shall concentrate on one kind of material that have played a major role in the making of Thule, past and present, namely wood – something of an irony in the treeless High Arctic, but all the more telling for that.

Wood was always vital to both transport and hunt. The *umiaq* (the large communal skin-boat that came to Greenland with the Thule Inuit around 1200-1250), the kayak and the dog sledge that entered at the same time, all of them required a strong and flexible wooden framework, apart from everything else. Harpoons, bows and arrows likewise depended on access to some measure of wood. When waters at the top of the Baffin Bay were (and are) open during summer, driftwood became available in this otherwise absolutely treeless region, delivered by West-Greenlandic Current (Hellmann et al., 2013).

The driftwood ultimately derived from the Polar Sea, often brought there by rivers from the vast Canadian or Siberian landscapes. The Polar Current was in permanent motion, moving south along the eastern shores of Greenland, carrying also the huge icebergs that have always made traffic on the North Atlantic a dangerous affair, and turning round Cape Farewell, before moving up north along the west coast of Greenland. Through this natural transport system, the Polar Current gave vital energy to social life also in Northwest Greenland, by its capacity for bringing driftwood to the shores – at least the southern parts of it, from where it could be transported further north by people themselves, travelling on the ice.

In the Thule Region, driftwood became inaccessible during the Little Ice Age (c. 1350-1800), because the packed ice in the Melville Bay

would prevent the West Greenlandic Current from delivering the goods. This significantly weakened the material basis of local hunting life, de-animating it in the process, as it were; yet also in a sense re-animating by the invention of sledges made of whale- and walrus-bone. When Marcel Mauss wrote about the Eskimos in the Thule District in 1906, summarizing the available records in 1906, he noted their extreme poverty, and emphasized the lack of driftwood, concluding that: 'These unfortunate Eskimo were reduced to such circumstances that they retained merely the memory of their former technology' (Mauss, 1979: 42-43). In actual fact, even the memory was fading after two to three centuries of being closed in by the sea-ice. It took some immigrating 'kinsfolk' from Baffin Land, travelling across Smith Sound in the late 1860es to truly assess the magnitude of the loss, however, and to reinvigorate forgotten technologies. At the time, the population was down to c. 100 people (Hayes, 1866: 386).

The general point is that the global process of cooling during the Little Ice Age, originating in the Earth's own geological history, deeply impinged on the life of the tiny population in the High North. In face of this, 15 newcomers from America made a huge difference; the clash of scales bears noticing. An old man from the group of American immigrants, who was still alive when Knud Rasmussen arrived in 1903, told him: "we taught them to build kayaks, and to hunt from kayaks. Before that they had only hunted on the ice, and had been obliged during the spring to catch as many seals, walruses, and narwhals as they would want for the summer, when the ice had gone" (Merqussaq, quoted in Rasmussen, 1908: 32).

Other technologies, such as bows and arrows were likewise re-invented, and with a more stable provision of wood from the European sailors, forgotten technological skills could be restored; these technologies still play a central role in the hunting activities of the north. In spite of its being a non-native resource, wood was a vital part of a larger assemblage of ice, sea-currents, explorers, and encounters, an agent in its own right, making the landscape either shrink or expand in terms of its potential, allowing different kinds of game to be hunted, opening or closing opportunities as the ice allowed, and as the sea-currents made possible. What we are faced with here is the configurative power of global water in the long term.

What does this observation do to the notion of the local landscape? How far does it stretch, when the agency of its material parts points to the place as co-constituted by matters of different temporalities and spatial connections, of different climates and immigrants from elsewhere? Bennett's vision of agentive assemblages leads us towards an important question concerning the sovereignty of language and the ways it is put to use in singling out what matters.

But what if we loosened the tie between participation and human language use, encountering the world as a swarm of vibrant materials entering and leaving agentic assemblies. We might then entertain a set of crazy and not-so-crazy questions: . . . Do sand storms make a difference to the spread of so-called sectarian violence? . . . Can a hurricane bring down a president? . . . Can an avian virus jump from birds to humans and create havoc for systems of health care and international trade and travel?
(Bennett, 2010: 107)

Thinking back to the driftwood, I may add another question: 'Can logs lost in the river by Siberian woodcutters keep a community in Northwest Greenland with meat?' Yes, even such small events matter in the complex processes that make a landscape, as we have seen. Bennett's vision is to acknowledge the non-human multitudes as something more than context, constraint, or tool – and seeing them instead as participants in the political ecology of which humans are also part. Rather than fixing materiality as a stable thinginess it is more productive 'to theorise a materiality that is as much force as entity, as much energy as matter, as much intensity as extension,' as she suggests (ibid.: 20). Bennett's notion of vibrant matter and distributive agency acknowledges the powers vested in relations rather than things, and this adds to the provocation that the lived landscape always is – including the enigmatic sea.

This observation also fits the Pacific Ocean, equally susceptible to the climatic shifts through the medieval warm period and the Little Ice Age (Nunn, 2007b). During the former, sailing across the Pacific and peopling most of the islands was relatively easy, due (probably) to the prevailing winds. Evidence shows how sea levels rose slowly during the warm years, only to fall abruptly up to as much as 135 centimetres (on average 70-80 centimetres) during the so-called A.D. 1300 Event, the name given to the abrupt cooling that replaced the warm medieval period; this cooling was in all probability accompanied by greater storminess (ibid.: 2-3).

The Pacific development mirrors the situation in the North Atlantic, where the easy travels of the Norsemen during the medieval warm period enabled them to settle on the Faroe Islands, Iceland and the southern parts of Greenland, and even on the eastern coast of America, facilitated by favourable winds and easy seas (Hastrup, 1985). By contrast, the ensuing period from c. 1400 onwards made Iceland an almost impossible place to live – at least in the old ways, and the Norsemen disappeared from both Greenland and the American coast, while the Icelanders were impoverished and went starving for centuries (Hastrup, 1990). What we

have here is a global climatic development to be acknowledged as of direct historical impact. Both in the Pacific and the North Atlantic, the 'times of plenty' of the Middle Ages were replaced by 'times of less' during the ensuing cooling, as they were in the Pacific (Nunn et al., 2007). While no simple relation of cause and effect, the shifting seas did have a major impact upon the configuration of society, including patterns of habitation.

As recently noted by Paasche and Bonsdorf (2018), in an article 'The Wicked Ocean,' we need to balance our conventional land-based perspective on climate change with a more refined view of the ocean, which is so much more than a surface. While driftwood evidently was ferried along with the surface waters and sea ice around Greenland, we need to better understand the engine of ocean circulation and the sinking of surface water - an engine that helps maintaining the balance in the earth's climate (ibid.: 265). On a human time scale, the ocean engine is slow, given the volume in question, explaining why it can take 1200-1500 years before submerged surface water in the Pacific Ocean reach the deepest parts of the basin (Gebbie and Huybers, 2012) or even longer before it resurfaces, all depending on which ocean and water mass you examine (ibid.). This engine affects the historicity of water.

In the process by which we, the humans, have created modern society through industrial revolution, with all that implies of contamination of the sea, we 'have created a series of wicked problems where the solutions we propose oftentimes trigger new problems, or are merely covering up new sins' (Paasche and Bonsdorf, 2018: 266). A significant part of the new problems relates to the unprecedented impingement of anthropogenic forces upon the 'natural' processes, highlighting and further complicating the spatial - and temporal ramifications of social life.

Non-scalability: The nature of fluid worlds

From the configurative power of seawater we shall now turn our interest towards the non-scalable quality of fluid worlds - defying the simple understanding of the hydrological engine. For centuries hydrology strived to define and isolate water from both history and society, abstracting it from the messiness of most landscapes (Linton, 2010). Popular depictions of the hydrological circle abound, and what they share is the suggestion that in principle we are dealing with a system in balance; it has become so obvious that it is often seen as 'one of nature's grand plans'. In the Handbook of Hydrology (from 1993), it is described in the following way:

> *The hydrologic circle is the most fundamental principle of hydrology. Water evaporates from the oceans and the land surface, is carried over the earth in atmospheric circulation as water vapour, precipitates again as rain or snow, is intercepted by trees and vegetation, provides a runoff on the land surface, infiltrates into soils, recharges groundwater, discharges into streams, and ultimately flows out into the oceans from which it will eventually evaporate once again. This immense water engine, fuelled by solar energy, driven by gravity, proceeds endlessly in the presence or absence of human activity (Maidment, 1993 quoted in Linton, 2010: 109).*

As pointed out by Linton (and before him by Tuan, 1968), the actual hydrological forces are of course deeply marked by a human story. The system is far from stable; human action, social demands, and political priorities always infiltrate measurement. In other words, water is never an abstraction when seen from the point of view of humans, who experience its many forms and forces: Ice, snow, seas, waves, rain, rivers, floods, swamps, wellsprings, ground water, dew, steam – each of which engender particular meanings and sensations, and makes certain social forms possible or prohibitive. While certainly 'natural' (albeit in different ways), water is also very much material, political, and bio-political, and poses a deep challenge to the nature/society binary (Bakker, 2012: 621). Focusing on water means letting it co-format the analysis and allowing it to determine the bounds of the field.

Malinowski's studies of the Trobriand Islands spring to mind, because his close attention to the actualities of social life made him sense that the islands were connected rather than separated across the sea, and that the social unfolded by way of canoes as much as by gardening and chanting for a good harvest (Malinowski, 1922: 1935). More recently, ocean ethnographies of a slightly different kind have made more of the sea as an agent, such as for instance Katharina Schneider's (2012) succinct analysis of saltwater sociality in Melanesia. She studied a community of fishermen islanders living off a larger island, and showed how 'movement' was the predominant mode of objectifying social relations, suggesting that movements should be seen as objects in their own right. This installs fluidity into the objects, constantly changing form, and showing the contingency of outcomes (ibid.: 21). The force of this example lies with the ways in which the fluid social forms and values permeate the sense of social relations in a wide world of connections.

We saw the implications of this in the long-term development of human history in the Pacific, and we rediscover it in Stefan Helmreich's ethnography, *Alien Ocean* (2009). Helmreich dived into the microbial seas

and the world of marine biologists. In the process, he encountered global networks of science, of capitalism, of global waste, and of activism that showed how deeply even the oceans of the planet are now integrated in global (social) processes, often talked about as if they belonged exclusively to the landmasses and their inhabitants. Helmreich was moved towards recognition of the need to rethink theory - and taxonomy - in a fluid world.

This takes me back to the High Arctic hunters, living around the North Water – a so-called *polynya*, i.e. a patch of Arctic sea that is more or less open or only covered by a thin layer of ice for most of the year. *Polynyas* form productive oceanic spaces, both in terms of primary biomass, crustaceans, fish, and a welter of birds and marine mammals higher up the food chain, benefitting from the feeding and breathing space offered by the open water oasis. It fosters a 'sea-ice community', in natural scientific terms, and its inhabitants can be depicted and mutually related. Yet, in practice, the *polynya* has never been perceived locally as a flatland of multiple species, among which the hunters could pick and choose the day's menu.

The animals were never aligned in practice, nor were they present in the polynya at the same time. Relations between people and animals were always differentiated, and determined by season and social values rather than abstract taxonomy. Thus the polar bear always occupied a very special position, owing to its status as both hunted and hunter, entitling it to particular respect. Until recently, bear hunting was free in Avanersuaq, given its prominent position within the larger social ecology; the sledge dogs could be amply fed from its meat, as could people, but the fur for clothing was the crux of the matter. Now, access to bears is hampered by the dwindling sea-ice. Another animal of concern is the walrus; since prehistoric times, walrus bone has been used for artwork and trade, and until recently it has been a vital source of meat for both humans and dogs. With the decrease in ice cover, access by sledge to the walruses' haul-out places has become more complicated, and in some years even impossible. While no longer a great delight for people, the dogs still need it and they suffer a lot from the meagre supply of walrus meat; the inevitable meat caches of stone on the beaches are often empty. Again, the assembled world of humans and non-humans is multi-scalar, not taxonomic.

One of the challenges anthropologists are faced with in the field is to assess and properly describe the agency of available resources. How may we balance our knowledge without ending up once again in new forms of separation between the natural and the social dimensions, e.g. the soil and the farmer, the marine mammal and the Arctic hunter, or the monsoon and the peasant? Whatever we are defining or un-defining as living or social, humans are the definers; we can 'only know more-than-human socialities through human knowledge practices, including practices of living' (Tsing, 2014: 34). It is these knowledge practices that we must refine to fit the fluid world.

This takes me to India, where Frida Hastrup studied a coastal community in Tamil Nadu in the aftermath of the 2004 Tsunami during successive years, and found that the catastrophe was gradually enfolded into the ordinary – so to speak – including the incessant talks about wind and weather, and not least the monsoon (Hastrup, 2011). The latter was generally depicted as a time of heavy downpours, indistinct fevers, and seen as being out of control. As she noted, the break of routines that followed, whether in fishing or in school activities, were not always related to the actualities of the weather. Downpours and odd winds might prevail, but so might calm and bright sunny days – equally letting children off school, with reference to the rainy season. Speaking of the rough season, i.e. the season when the northeast monsoon would normally sweep over Tamil Nadu, as if it were both a regular and a well-defined time-space, turned out to be a kind of ordering device that could be extended to incorporate different kinds of disasters, such as the Tsunami and an accidental drowning. The tsunami was a one-time event, yet it was enfolded into the ordinary notions of the environment, seen and classified as increasingly anomalous even years after the event. Hastrup writes:

> *During the first couple of weeks of March 2008, a series of heavy rainfalls swept over the village. This was highly unexpected as the monsoon season . . . is normally limited to the months of October, November and December. Among the fishermen there was talk of this being an untimely rough season. Fishing was put on hold; small canals leading the rain water away from the houses were dug, sand bags were put around the houses to keep water out, and the villagers quickly settled to wait for better days. The ill-timed rains seemed once again to remind the fishermen that the ability to predict weather conditions and thus to practice their everyday activities had been shaken, and they gave rise to a legion of remarks that connected this seasonal abnormity with the tsunami, which, in turn, was seen as connected with climate change. Murugan, one of the local fishermen, would ponder: look at this rain. It is not even the rough season. All these changes . . . I don't know; I think they have come to stay (Hastrup, 2011: 74-75).*

From this quotation, I want to suggest that just like animal-talk around the High Arctic oasis defies conventional schemes of taxonomic

classification and alignment, so weather-talk in Tharamgambadi defies customary seasonal organisation. In both cases, people seek to deal with the (new?) unpredictability of the environment, by devising new strategies of forecasting. This is one of the consequences of the liquid fears that haunt the globe, 'glimpsed everywhere but nowhere to be seen' (Bauman, 2006: 2). The cases dealt with here teach us not to take classification and speciation – of animals or seasons – at face value. We need to recognize a need for 'nonscalability theory to understand how [such] multispecies landscapes work' (Tsing, 2012: 523). This is the key to understanding the fluid worlds with which we all live at the present moment. We cannot fix the fluidity and remain true to the lived world; water is what we make of it, and the moment it is fixed – whether in a hydrological cycle, a sea-ice community, or in a rough season – it begs new questions.

Turbulence: The indeterminacy of the field

In the Thule region, life has always unfolded in dialogue with place – as constituted both from within and without through various climatic fluctuations, materialities, and animal companions – a non-scalable assemblage, certainly. Today, Thule is clearly linked up with the global challenges of the Anthropocene; yet, this is an external image. From within the landscape that has been unintentionally designed for them it is the daily struggle for income – in some form – that sets the frame for action. People live in a condition of manifest precarity, one of the actual implications of the Anthropocene, as described by Tsing in the following way:

> *Precarity is the condition of being vulnerable to others. Unpredictable encounters transform us; we are not in control, even of ourselves. Unable to rely on a stable structure of community, we are thrown into shifting assemblages, which remake us as well as our others. We can't rely on the status quo; everything is in flux, including our ability to survive. Thinking through precarity changes social analysis. A precarious world is a world without teleology. Indeterminacy, the unplanned nature of time, is frightening, but thinking trough precarity makes it evident that indeterminacy also makes life possible (Tsing 2005: 20).*

This precarious world is one of the most pertinent anthropological concerns about the human condition in the 21st century. In the presentation of motley details from various regions above, the main argument has been that even comprehensive global forces are processed from located experiences and from the minutiae of lived life; this is what may 'add up' to new insights into the indeterminate forms of social life. It is also from there we can meaningfully discuss when and how changes in degree may become irreversible changes in kind.

The fluidity and indeterminacy of the watery fields we are studying teach us to keep things open while assembling the elements that will eventually become part of a more comprehensive analysis of the ever shifting natural-social world. David Turnbull has provided an interesting example from turbulence research, which he entered as a fieldworker in order to understand how un-fixed forms may be theorised. Briefly, turbulence research seeks to understand and model such diverse phenomena as waterfalls, cloud formations, smoke plumes from an erupting volcano, or water whirls. According to Turnbull, these phenomena are too disordered, too chaotic, even too natural, to be hemmed in by mathematical models (just like sea-water and rain). He cites one of the turbulence researchers for saying: 'We don't even have a definition for turbulence, although it is generally agreed that it has the following properties: It is unsteady; three dimensional; apparently random; dissipative; and has motions which are spread over a range with nonlinear interactions along the scales' (Turnbull, 2003: 188). Turnbull adds:

> *Yet despite the lack of consensus there is sufficient coherence for the practitioners to act as if there is a field of turbulence research. Coherence in this case does not derive from a unifying paradigm or the adoption of an agreed set of instruments or methods. It derives from a very loose recognition that the phenomenon at issue is turbulence, even though its nature cannot be specified and even though it occurs in a very diverse set of flow situations from blood vessels to aircraft wings to the earth's atmosphere. But equally important, coherence results from the work of the researchers in the field trying to establish equivalences and connections in problem solving while also struggling for authority (Turnbull 2003: 190).*

While actual turbulence research is both local and messy, there is a shared interest in assembling knowledge into a more comprehensive field, through a continual exchange and emerging agreement of how to impose some order onto nature through the collective work of practitioners in the area. 'The kinds of ordering that are achieved are contingent, depending on the ways in which the situated actors locally deploy a wide variety of elements in the assemblage, including theory, tools and funds' (ibid.: 204). Agreement is of course as tenuous as turbulence is indeterminate.

Indeterminacy seems to accelerate at present, not only in the field of turbulence research, but certainly also in other branches of research, including anthropology, working in ever changing worlds. As Vincent Crapanzano has suggested, 'it should always be pluralised – in its national trajectories and across those trajectories. The beauty of the field lies in its fluidity – its resistance to tight compartementalisation and territorialisation. It is, in essence, an interstitial discipline' (Crapanzano, 2004: 5). I would take this further to scholarship more broadly, where the outpour of work on dwindling ice-cover and accelerating monsoon anomalies, for instance, leaves us in no doubt about the fundamental indeterminacy of the global climate system. The Anthropocene seems to accelerate under the weight of its interpreters competing over small- or large-scale conclusions about sea-level and rain anomalies (eg. Prakash et al., 2012), to a degree where one must ask all over again what we should mean by an anomaly – and on which spatial and temporal scale.

The challenge is that the elements of the Earth run their own course (deeply affected by humans, obviously), and could not care less about anomalies. Modern science adds to the global unease by taking its own tradition of rationality too seriously, and bracketing alternative ways of thinking. I am not suggesting that we give up on science, but that we listen more carefully to other ways of expressing concerns – and learn from the fishermen of Tamil Nadu for instance to think about monsoon anomalies as integral parts of the real world, with which one has to cope. We cannot externalise the anomalous, once it affects our lives, or the others, whose rationalisations have been bracketed (Turnbull, 2003). Yet we should realise that anomalies are defined, not simply discovered.

Interestingly, international legal bodies, such as the UNCLOS (The United Nations Convention on the Law of the Sea) work on a similar assumption of rationality, for instance when it comes to the regulation of living resources, on which the Thule hunters depend. In a clause on the conservation of living resources, it is stated that States shall (a) take measures which are designed, on the best scientific evidence available to the States concerned, to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield, as qualified by relevant environmental and economic factors, including the special requirements of developing States, and taking into account fishing patterns, the interdependence of stocks and any generally recommended international minimum standards, whether subregional, regional or global (UNCLOS, Article 119).

It is superfluous to point out the incompatibility between this well meaning clause and the lived reality of, say, the Thule hunters. For them, the North Water reality is much more messy; neither species, nor states are aligned in their experience. Scientific evidence is often questionable when detached from place and standardized. Clearly,

protection of endangered species is of utmost concern to the hunters, but a discussion between 'states' is invariably a discussion of numbers rather than meanings, and of species rather than meat and bearskin trousers.

Such incompatibility at the level of real life points to the need for keeping the waters open for multiple interpretations. This is where we need a new kind of science for the Anthropocene, a more daring one, and by implication a more realistic one. It is the more important as we, the humans, are the only ones with a language in which to discuss the turbulent relations with which we are faced - and with knowledge practices that make it possible to share knowledge across the globe, although not always easily. Recently the as yet opaque influence on the South-East Monsoon rains has been described in terms of other 'weather-systems, such as the Arctic oscillation, Siberian High and Western Subtropical high, as well as the complex Asian topography, i.e. the Siberian Plateau' (Loo et al., 2015: 822). With all due respect, this is a heaping of uncertainty upon uncertainty, even as it bows to science. It is an appeal to a context that remains undefined, while allegedly supplying some external causes for local troubles. The challenge for all of us is to identify figure and ground in a world where the ground itself is liquefying (to paraphrase Helmreich, 2009: 169). Times are indeed liquid, as Baumann has suggested, and for him this reshapes human virtue:

> *The virtue proclaimed to serve the individual's interests best is not conformity to rules . . . but flexibility: a readiness to change tactics and style at short notice, to abandon commitments and loyalties without regret – and to pursue opportunities according to their current availability, rather than following one's own established preferences*
> *(Bauman, 2007: 4).*

We could extend this to science, including ice-edge and monsoon research, in acknowledgement of the indisputable elusiveness of place.

Reading the Anthropocene: Vital Assemblages

Water literacy is a notion that is spreading, it seems. For some time, it has been cast (in the Global North) as 'knowing where your water comes from and how you use it,' including a 'basic understanding of water footprints, virtual water, groundwater recharge and consequences of over-drafting, how to move and control surface water, competing demands for water, and water conservation' (Reenberg, 2016: 185). In this paper, I have moved beyond this definition and opened up for local understandings within global weather-systems. The point is that water itself offers new ways of thinking and theorising about the world, which has so far been thought of mainly in terms of lands, nations, and sedentary

social forms. Focussing on water and fluid worlds enable us to theorise societies in constant movement, as they reformat themselves in response to increasingly fluid environments, and to new Anthropocene challenges, including the atmospheric brown cloud and other toxic legacies (e.g. Liepert and Gianninni, 2015). As suggested by Paasche and Bonsdorff, quoted before:

> *We need serious and solid science-and-society interactions to grasp, comprehend, communicate and ultimately perhaps try to tame some of the wickedness of the anthropogenised ocean*
> *(Paasche and Bonsdorff, 2018: 267).*

I would like to end with Anna Tsing, cited above on the precariousness of the present, and repeat that 'Thinking through precarity changes social analysis. A precarious world is a '*world without teleology*.' Indeterminacy, the unplanned nature of time, is frightening, but thinking trough precarity makes it evident that indeterminacy also makes life possible' (Tsing, 2015: 20; my emphasis). I find this statement liberating, and in tune with the far from teleological development of the earth (now and before), including the fluid environments we strive to comprehend. Water and other literacies must exceed themselves and contribute to the development through new kinds of analysis, opening up for novel forms of understanding – and hence for action.

ACKNOWLEDGEMENT

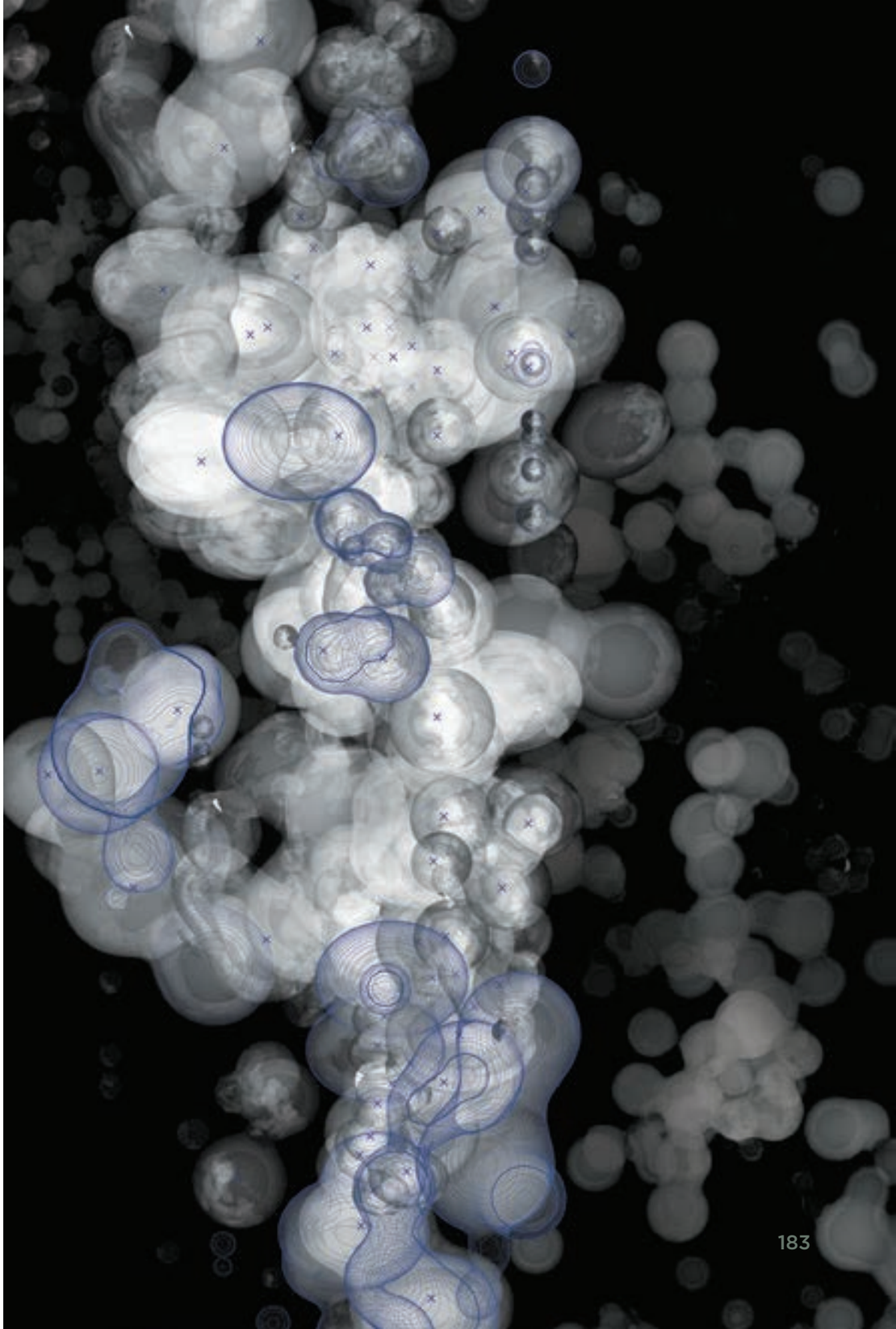
This paper was given to the symposium Monsoon [+ other] Waters, hosted by the ERC research project, Monsoon Assemblages, at University of Westminster in April 2018. I want to thank Lindsay Bremner for inviting me, and the entire audience for an engaging discussion. Thanks are also due to the ERC for the Advanced grant (229459) on Waterworlds of which I was the PI (2009-2014).

REFERENCES

Bakker, K. (2012). 'Water: Political, biopolitical, material.' S*ocial Studies of Science* 42 (4): 616-623.
Baumann, Z. (2006). *Liquid Fear*. Cambridge: Polity Press.
Baumann, Z. (2007). *Liquid Times. Living in an Age of Uncertainty*. Cambridge: Polity Press.
Bennett, J. (2010). *Vibrant Matter. A Political Ecology of Things*. Durham and London: Duke University Press.
Braudel, F. (1972). *The Mediterranean, and the Mediterranean World in the Age of Philip II*. Trans. S. Reynolds. London: Collins.
Hastrup, F. (2011). *Weathering the World. Recovery in the Wake of the Tsunami in a Tamil Fishing Village*. Oxford: Berghahn Books.
Hastrup, K. (1985). *Culture and History in Medieval Iceland. An Anthropological Analysis of Structure and Change*. Oxford: Oxford University Press.
Hastrup, K. (1990). *Nature and Policy in Iceland 1400-1800. An Anthropological Analysis of History and Mentality*. Oxford: Oxford University Press.
Hastrup, K. (2013). 'Water and the Configuration of Social Worlds: An Anthropological Perspective.' *Journal of Water Resources and Policy* 2013 (5): 59-66.
Hastrup, K. (2017). 'The North Water: Life on the Ice Edge in the High Arctic.' In: K. Hastrup and F. Hastrup. (eds.). *Waterworlds. Anthropology in Fluid Environments,* 279-299. Oxford: Berghahn Books.
Hastrup, K. and Rubow, C. (eds.). (2014). *Living with Environmental Change. Waterworlds*. Abingdon: Earthscan/ Routledge.
Hastrup. K. and Hastrup, F. (eds.). (2017). *Waterworlds. Anthropology in Fluid Environments*. Oxford: Berghahn Books.
Hayes, I. I. (1866). *The Open Polar Sea. A Narrative of a Voyage of Discovery towards the North Pole, in the Schooner United States*. London: Sampson Low, Son and Marston.
Hellmann, L., Tegel, W., Eggertsson, Ó., Schweingruber, F.H., Blanchette, R., Kirdyanov, A., Gärtner, H., and Büntgen, U. (2013). 'Tracing the Origin of Arctic Driftwood.' *Journal of Geophysical Research: Biogeosciences* 118: 1-9.
Helmreich, S. (2009). *Alien Ocean. Anthropological Voyages in Microbial Seas*. Berkeley: University of California Press.
Liepert, B.G. and Giannini, A. (2015). 'Global Warming, the Atmospheric Brown Cloud, and the Changing Indian Summer Monsoon.' *Bulletin of the Atomic Scientists* 71 (4): 23-30.
Linton, J. (2010). *What is Water? The History of a Modern Abstraction*. Vancouver: University of British Columbia Press.
Loo, Y.Y., Billa, L. and Singh, A. (2015). 'Effect of climate change on seasonal monsoon in Asia and its impact on the variability of monsoon rainfall in Southeast Asia.' *Geoscience Frontiers* 6: 817-823.
Maidment, D. R. (ed.). (1993). *Handbook of Hydrology*. New York: McGraw-Hill.
Malinowski, B. (1922). *Argonauts of the Western Pacific. An Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Guinea*. London: Routledge and Kegan Paul.
Malinowski, B. (1935). *Coral Gardens and their Magic. A Study of the Methods of Tilling the Soil and Agricultural Rites in the Trobriand Islands*. London: Allen and Unwin.
Marchand, T. H. J. (2008). 'The Objects of Evidence.' In: *The Objects of Evidence: Anthropological Approaches to the Production of Knowledge. Special issue of the Journal of the Royal Anthropological Institute*: 1-21.
Massey, D. (2005). *For Space*. London: Sage.
Mauss, M. (1979). [1906]. *Seasonal variations of the Eskimo. A Study in Social Morphology* (with H. Beuchat). Trans. J. J. Fox. London, Routledge and Kegan Paul.
Nunn, P. (2007a). *Climate, Environment and Society in the Pacific During the Last Millennium*. Amsterdam: Elsevier.
Nunn, P. (2007b). 'The A.D. 1300 Event in the Pacific Basin.' *The Geographical Review* 97 (1): 1-23.
Nunn, P., Hunter-Andersen, R., Carson, M. T., Thomas, F., Ulm, S., and Rowland, M. J. (2007). 'Times of Plenty, Times of Less: Last-Millennium Societal Disruption in the Pacific Basin.' *Human Ecology* 35: 385-401.
Paasche, Ø. and Bonsdorff, E. (2018). 'The Wicked Ocean.' *Ambio* 47: 265-268.
Prakash, S., Mahesh, C., and Gairola, R. M. (2012). 'Sea level anomalies in the tropical Indian Ocean during two contrasting southwest monsoon years.' *International Journal of Ocean and Climate Systems* 3 (2): 127-133.
Rasmussen, K. (1908). *The People of the Polar North. A Record*. (Compiled from the Danish Originals, G. Herring (ed.)). London: Kegan Paul, Trench, Trübner & Co. Ltd.
Reenberg, A. (2016). 'Water Literacy in the Sahel. Understanding Rain and Groundwater.' In: K. Hastrup and F. Hastrup, (eds.). *Waterworlds,* 184-202. Oxford: Berghahn Books.
Schneider, K. (2012). *Saltwater Sociality: A Melanesian Island Ethnography*. Oxford: Berghahn Books.
Tsing, A. L. (2012). 'On Nonscalability. The Living World Is Not Amenable to Precision-Nested Scales.' *Common Knowledge* 18 (3): 505-524.
Tsing, A. L. (2014). 'More-than-human-sociality: A call for critical description.' In: K. Hastrup (ed.). *Anthropology and Nature*, 27-42. London and New York: Routledge.
Tsing, A. L. (2015). *The Mushroom at the End of the World. On the Possiblity of Life in Capitalist Ruins*. Princeton and Oxford: Princeton University Press.
Tuan, Y. F. (1968). *The Hydrologic Cycle and the Wisdom of God: A Theme on Geoteleology.* Toronto: University of

Toronto Press.
Turnbull, D. (2003). *Masons, Tricksters and Cartographers: Comparative Studies in the Sociology of Scientific and Indigenous Knowledge*. London: Routledge.

P183 Simulation of water droplets. Laura Nica, 2017. Software: RealFlow, Rhino, Grasshopper.



HAUNTED LANDSCAPES: GHOSTS OF CHENNAI PAST, PRESENT AND FUTURE YET-TO-COME

Beth Cullen is an anthropologist and Monsoon Assemblages Research Fellow. Her work focuses on human - environment relations using ethnographic and participtory visual and spatial research methods. Water has been a theme in her work, including research on the impact of large-scale irrigation on pastoralists in the Rift Valley and raiwater harvesting interventions on farmers in the Ethiopian highlands.

The landscape of Chennai is haunted, troubled by the ghosts of reservoirs, or tanks, that have been destroyed in the process of urban expansion. These ancient water management structures, created from the eighth century onwards by constructing curved earthen embankments or bunds next to natural depressions in the landscape, once existed in abundance. Although they mitigated flood and drought for centuries, they have been systematically removed from the urban environment to create land for buildings and infrastructure. Despite their removal, these reservoirs continue to have an absent presence in the city. Known as *eris* in Tamil, they are commonly referred to as water bodies in English, and are frequently personified. Those that still remain are described as dead or dying, and those that are lost are described as having been choked to death, sacrificed to accommodate growth, becoming casualties of urban expansion. There is a violence associated with their disappearance. They are dissected, dismembered and truncated by highways, polluted by sewage and industrial effluent, choked with garbage and used as makeshift dumping grounds, and in their final throes they are built upon. Perhaps because of the violence enacted upon them, notions of haunting arise, permeating conversations and popular representations in subtle but complex ways.

Conceptualising spectral materialities

Ghosts have featured in oral and written narratives in various forms throughout history and across cultures, serving diverse socio-cultural functions. At the end of the twentieth century, notions of ghosts and haunting have resurged, coming to play an influential role in popular culture and academia alike (Blanco and Peeren, 2012). Reflecting this trend, the ghost has emerged as an important analytical tool within the social sciences in recent years. ‘Certain features of ghosts and haunting – such as their liminal position between visibility and invisibility, life and death, materiality and immateriality, and their association with powerful affects like fear and obsession - have been employed to theorize a variety of social, ethical and political questions’ (ibid.: 2). This is exemplified in the ‘tropic status’ acquired by haunting among geographers concerned with the colonial and postcolonial (Cameron, 2008: 384) and the frequent use of spectrality in critical analysis of modernity, globalisation and

neoliberalism (Derrida, 1993; Muir, 2003; Bonefeld, 2000).

However, ghosts and hauntings are not just stories or narratives, they can also be material presences that have powerful effects on people and places. In this paper, I argue that the persistent materiality of absent eris can be understood as a kind of haunting; as Gordon (1997: 8) argues, ghosts are 'one form by which something lost, or barely visible, or seemingly not there … makes itself known or apparent.' A materialist understanding of ghosts is in line with Hatfield (2011), who urges that we refrain from 'reading' haunting as a 'byproduct of social reality' (:73) and instead engage with its materiality. Maddern and Adey (2008: 292) also state 'there is a need to move beyond the use of spectres as just narrative, metaphorical or allegorical devices' and to give 'shape' and 'form' to the way in which we can understand haunting. Exploring the lingering impact of *eris* in Chennai, and the various ways in which they trouble the city, provides an avenue for exploring the materiality of ghosts and haunting.

While most landscapes bear the imprint of past human land use, some imprints are more persistent than others. The South Indian landscape was radically altered from the eighth century onwards through the building of *eris* (Aubriot and Prabhakar, 2011). Created by constructing earthen embankments next to naturally occurring depressions where water has a tendency to gather, *eris* are a collaboration between human design, weather and the morphology of the land. Over time, these structures came to form a vast meshwork of bunds, overflow weirs, sluice gates and channels which criss-crossed the entire region (Parthasarathi, 2017). By promoting a moisture-laden environment, eris modified atmospheres, soils, hydrology and biodiversity and facilitated large-scale human habitation. The legacy of these 'enduring landscape features' (Morrison, 2014: 60) is deep and long-lasting, influencing human and non-human communities alike.

Perhaps because of their long-term presence, *eris* continue to have an influence even in their absence. They may be abandoned, repurposed and dismantled but they remain 'in countless material and immaterial forms, traces, remnants, fragments' (Crewe, 2011: 27). Their absent presence continues to effect urban spaces as well as people's memories, practices and experiences. As Bille, Hastrup and Sorensen (2010: 4) suggest, 'what may be materially absent still influences people's experience of the material world', as a result, 'phenomena may have a powerful presence precisely because of their absence.' Notions of haunting related to *eris* perhaps arise, because of the tension between their presence and absence, materiality and immateriality. After all, the ghost, through its hauntings, is both present and absent, material and immaterial. Through their absent presence, then, the ghosts of Chennai's eris have a materiality and a power to invoke and incite (Giovannoni and Quattrone, 2017). They haunt in a multiplicity of ways and through these hauntings they push back and resist attempts to eliminate them and prompt people into action.

Ghosts of Chennai past

Eris were gradually removed from the early twentieth century onwards. Their disappearance seemed to go largely unnoticed by urban publics until the 1990s, when the impacts of rapid urban expansion started to become apparent. The proliferation of market driven building activity in the 1970s and 1980s had sped up their eradication. In fact, the development of the city can almost be traced through the housing schemes that were built over water bodies. Newspaper reports in the English-speaking press published over the last decade, describe these *eris* as lost, vanished or disappeared, reminiscent of missing persons. Such descriptors evoke a sense of mystery and imply that these disappearances happened suddenly and without explanation. Efforts to explain their disappearance, and make sense of their loss, have manifested in various initiatives which strive to locate the sites of missing water bodies and identify the causes of their eradication.

Fig.01 Detail of The Madras Hunt Map. Government Survey Office, 1911, 1913.
Sourced from: http://gibberandsqueak.blogspot. com/2008/11/madras-hunt-map-1911-1913-or-how-green.html.

The legacy of the tanks is etched into the fabric of the city, if you know where to look and what to look for (Fig.01). Counter-mapping initiatives by academics and environmental activists are informed by clues in place names, references in historical records and fragments from urban planning and development documents. Traces of the tanks remain in street names, such as 'Lake View Road,' where there is no lake to be seen (Sriram, 2014), or the curvature of certain streets, or conspicuous lines of Palmyra palm trees indicating the presence of former tank bunds. In their shaping of the urban fabric, these absent eris retain their power to inform a sense of place. The locations of lost water bodies are identified by layering modern and historical maps and aerial photos, which combined create spectral maps of the missing. These traces and stories which collect in the built environment, in artefacts and landscapes are pieced together to draw out an understanding of place and space (Armstrong, 2010: 245). Efforts to map Chennai's missing *eris* have proliferated in recent years, partly as an attempt to piece together the history of the city but also in an effort to understand the floods and droughts that the city is experiencing.

As the story of the *eris* has emerged, it has become evident that their disappearance is, in part, a colonial legacy. 'The British showed the way for urbanising Chennai by filling up the water bodies' (Saranathan, 2015). Early reports on the 'medical topography' of the Madras Presidency refer to 'stagnant and offensive tanks and lodgements of water' (Thorpe, 1842: 110). In the first colonial attempts at town planning, the British architect H. V. Lanchester (1918: 102) recommended that certain tanks be removed, 'though all tanks cannot be abolished, there are a great many which serve no useful purpose and which in the general interests of the city, should not be allowed a continued existence.' Such recommendations precipitated the removal of *eris* from the city and their replacement with piped water supply and bore wells. The eradication of traditional water infrastructures was, in part, an attempt to improve public health, as well as a conscious strategy to extend colonial control (Zaheter, 2016). Over time, *eris* were no longer considered essential for the provision of water (Nagendra, 2016) and their ecological significance was largely forgotten (Arabindoo, 2016), fundamentally changing the way in which people thought about and engaged with them.

Giblett (2016) argues that dredging, draining and filling represents a particularly European attitude to wetlands. These attitudes first emerged at home, linked to imperialist and capitalist efforts to separate land from water. During the medieval and later centuries, vast stretches of wet lands throughout western and northern Europe were drained and reclaimed, including the Somerset Levels (Williams, 2009) and the East Anglian Fens (Irvine, 2016). These were projects of internal colonisation and improvement, aiming to create productive land from waste and assert order in seemingly chaotic spaces (ibid.). Having been piloted in Europe, these ideas and techniques were exported to the colonies and applied to other wet lands. The same rationality can be seen at work in Madras, where wetlands, including *eris*, were classified as waste or *poramboke* (Gopalakrishnan, 2017). Their perceived lack of value, justified subsequent efforts to drain and fill them to create land for urbanisation. Tracing these connections reveals links between disparate landscapes spanning vast spatial and temporal scales. The vanished *eris* of Chennai are both 'ghosts of empire' (Kwarteng, 2013) and ghosts of former commons, a reminder of the ongoing legacies of colonial rule, the consequences of which ripple through the ages.

Ghosts of Chennai present

In December 2015, Chennai experienced a devastating flood. Torrential downpours saturated the city, leading the government to declare the city a disaster zone. Thousands of people were driven from their homes and cut off from basic supplies, and hundreds lost their lives. The city sustained estimated economic losses of nearly US$2.2 billion (Business Standard, 2016). 57,000 homes in Chennai suffered structural damage, particularly those belonging to low income groups (Lopez, 2015). In retrospective analyses, the flood is described as a manmade disaster, the result of unplanned urban growth and the widespread eradication of water bodies. 'There has been a total disconnect between hydrology and urban planning … recharge structures like lakes, tanks, ponds and other wetlands in the city have been disregarded' (Sengupta, 2015). The flood resulted in a palpable sense of horror as people came to realise the consequences of eradicating water bodies. In doing so, the city has changed its geographical texture (Dutta, 2017), a change that is not easily undone.

Notions of haunting arise in people's recounting of the flood. Traumatic memories haunt survivors every monsoon season, with some now living in morbid fear of the rains. For others, the flood itself was a kind of haunting. 'These disappeared water bodies are coming back to haunt the city as coastal waters and rainfall find no escape routes, but instead flow into our houses, offices and roads in search of their old homes' (Battacharyya, 2017). The flood was understood by many to be a form of revenge, a punishment for human violations of the city's water bodies. As one Chennai resident explained, 'Lots of buildings have been constructed on the tanks. This is one of the reasons why nature got furious and flooding happened in 2015. We are going against nature. When there is a drought we have to accept it, when there is a flood we have to accept it.'[01]

P190-191
Fig.02 Velachery, Chennai.
Beth Cullen and Georgia Trower, 2018.
Village Map overlaid over Google Earth Image..


No. 139
SAINT THOMAS MOUNT
CANTONMENT
Guindy
Alandur
PARUT PIVAKKAM
Collectors Nagar
No. 118
GUINDY PARK
Balakrishnapuram
ADAMBAKKAM
Parthasarathy Nagar
Periyar Nagar
Sewa Nagar
No. 139
KANADAM
Periya

Although the 2015 floods were extraordinary, flooding is a recurrent feature of life in Chennai. Every rainy season low-lying areas are inundated with water and it is now understood that many of these areas were once *eris*. 'Certain parts of the city find themselves under water every year because most of these low-lying areas were once tanks' (Govindarajan, 2017). There is a sense that these lost tanks continue to have a presence even when they have been rendered absent. Although they are no longer visible, their traces remain below the surface, beckoning water to them. Water is considered by some to have a memory of its own (Doctor, 2015), remembering the location of the tanks even if people do not. 'Rainwater goes by habit to occupy its old haunts' (Jayaraman, 2015). This perhaps indicates an animism which disturbs modernist understandings, 'populating the world with souls and spirits, endowing things and nature with life, agency, and subjecthood' (e-flux, 2011). The presence of the spectral, then, reveals a vibrant materiality (Fig.02).

Absent tanks make their presence known in other more forceful ways. In July 2014, Faith Tower, an 11-storey residential building under construction in Moulivakkam collapsed killing sixty people. The building was situated in close proximity to Porur Lake and local accounts indicate that the area was always inundated when the lake was full and overflowing (Radhakrishnan et al., 2017). According to some, the 'popular reason for the collapse of this building is that soil tests were not done properly as that area was originally a tank' (Saranathan, 2015). Others say there is no evidence that the area is or ever was a wetland or catchment area (Sreenivas, 2014), yet the story continues to circulate. In many ways, the authenticity of these claims does not matter, they are yet another example of a disturbed water body exerting its presence. 'However much the speedy modern city could deny or repress its past … its swampy beginnings always come back to haunt it' (Giblett, 2016: 36).

It is perhaps unsurprising that notions of haunting arise in relation to violent floods and building collapses. 'Spectral accounts emerge as ways of making sense and even anticipating unexpected and indeterminable happenings' (Maddern and Adey, 2008: 293). While ghosts may be a way of apprehending that which we cannot explain or do not expect, these happenings point to certain material truths: that high-rise buildings should not be built on soils that cannot support heavy construction and that monsoonal cities will flood if space is not created for water. However, these truths, like the water bodies themselves, are repressed and ignored to facilitate the expansion of the city.

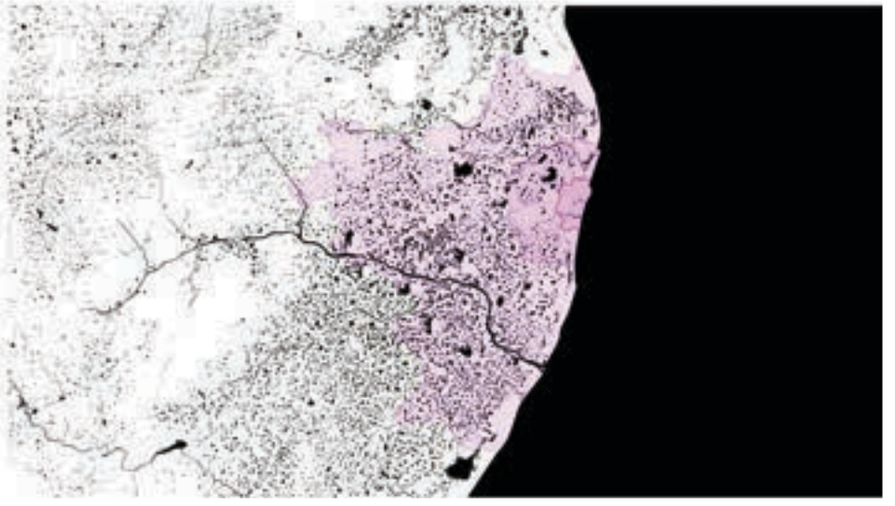


Fig.03 Chennai's metropolitan boundaries, 1919, 2011 and currently proposed. Beth Cullen and Christina Geros, 2018.

It could be argued that the continued destruction of Chennai's water bodies is associated with a particular neoliberal vision of the future, and an unwavering commitment to modernity. Chennai shows no sign of slowing down its growth. The boundaries of the city are set to expand to eight times its current size, taking the city's area from 1,189 km2 to over 8,878 km2 (Govindarajan, 2018) (Fig.03). This expansion will impact a vast territory, composed of around 4,200 water bodies (Special Correspondent, 2018). In discussions about expanding city limits, there has apparently been no mention of the protection of water bodies and biodiversity (Shekhar, 2018). As Tsing et al. (2017: 257) write, moving towards such a modernist future, premised on the separation of nature and culture, 'requires ruthless ambition – and the willingness to participate in great projects of destruction while ignoring extinction as collateral damage. The terrain carved out by this future is suffused with bad death ghosts.' In the case of Chennai, the 'bad death ghosts' of lost *eris* reveal the violence enacted on territories in the process of urbanisation. In this sense, these ghosts are 'not simply symbolic of a haunting loss' (McEwan, 2008: 34), they are both products and critics of modernity.

The absence of *eris* in Chennai haunts even the future of expansion and urbanisation. The city has far exceeded the carrying capacity of its terrain and is currently projected to run out of groundwater by 2020 (Shivakumar, 2018). Aquifers and groundwater reserves are becoming so depleted that wells are being sunk to much greater depths to find water (Lakshmi, 2017). As the city digs ever deeper to quench its thirst, aquifers are turning saline due to seawater intrusion (Times of India, 2015). This groundwater shortage is exacerbated by the filling in of water bodies and the concretisation of urban space, impeding the replenishment of underground aquifers. 'Vanished waterbodies and open spaces mean a drastic drop in groundwater recharge potential' (Lakshmi, 2018). As a result, the city stretches out its tentacles to source water from far away sources. Water tankers raid the hinterlands for water, farmers sell their groundwater to tanker owners who sell it on the city residents (Nurullah, 2017). In an echo of colonial processes of resource extraction, Chennai's unrestrained and rapid expansion is reliant on additional increments of land and their resources, which are then rendered invisible. By subsisting on these 'ghost acres' (Borgstrom, 1972) the water resources of the wider region are heavily exploited and in danger of collapse, proliferating a groundwater crisis at a territorial scale.

The ghosts of *eris* function as a warning. 'The character of ghosts, particularly historical ones, have a vexatious moral insistence - haunting the living (and by doing so, exposing guilt)' (Comaroff, 2007: 66). The appearance of ghosts represents 'an insistence that we acknowledge the role we play in present injustices … Ghosts, it seems have a politics' (Cameron, 2008: 383). The ghosts of Chennai's past and present are urging the city to re-examine its visions for the future by pointing to ghosts of futures yet-to-come. These ghosts unsettle assumptions about linear progress and force a consideration of how old ghosts might become part of the ecological balance (Comaroff, 2007: 67).

Conclusion

Through their absent presence, Chennai's ghosts trouble and disturb. They challenge linear conceptions of time and confound settled orders of past and present. The legacy of Chennai's missing *eris* draws attention to the multiple layers of time and materiality that accumulate in spaces of human occupation (Armstrong, 2010). They allow us to see that 'spaces and times are folded' (Maddern and Adey, 2008: 292), and suggest 'a space-time in which past, present and future co-exist, and interact, in uncertain and unpredictable ways' (Hill, 2013: 381). Understood in this way, 'the spectral is not a ghostly spirit hovering over a concrete world of real objects and living bodies, but is integral to our experience of the world' (ibid.). This requires us to take ghosts seriously. As Cameron (2008: 383) writes, 'it is only by living with, talking with, and accommodating our ghosts that we might 'learn to live' in these 'post' colonial times.' So, what might Chennai, and the world, learn by listening to the ghosts of *eris* past, present and future yet-to-come?

ACKNOWLEDGEMENT

This paper is a result of research and fieldwork conducted for Monsoon Assemblages, a research project funded by the European Research Council under the European Union's Horizon 2020 research and innovation programme (Grant Agreement No. 679873).

NOTES

01 Interview, 17th August, 2017.

REFERENCES

Arabindoo, P. (2016). 'Unprecedented natures?' *City* 20 (6): 800-821.

Armstrong, J. (2010). 'On the Possibility of Spectral Ethnography.' *Cultural Studies* 10 (3): 243-250.

Aubriot, O. and Prabhakar, P. I. (2011). 'Water Institutions and the 'Revival' of Tanks in South India: What is at stake locally?' *Water Alternatives* 4 (3): 325-346.

Bhattacharyya, D. (2017). 'Soaking ecologies: Rethinking Asian Urbanism.' *IIAS Newsletter* : 76.

Bille, M., Hastrup, F., and Sorensen, T. (eds.) (2010). *An Anthropology of Absence: Materializations of Transcendence and Loss*. London: Springer.

Blanco, M. and Peeren, E. (2013). 'Introduction: Conceptualizing Spectralities.' In: Blanco, M. and Peeren, E. (eds.). *The Spectralities Reader. Ghosts and Haunting in Contemporary Cultural Theory*, 1-27. New York: Bloomsbury.

Bonefeld, W. (2000). 'The Spectre of Globalization: On the Form and Content of the World Market.' In: Bonefeld, W. and Psychopedis, K. (eds.). *The Politics of Change. Globalization, Ideology and Critique*, 31-68. Basingstoke: Palgrave Macmillan.

Borgstrom, G. (1972). *The Hungry Planet. The Modern World at the Edge of Famine*. New York: The Macmillan Company.

Business Standard. (2016). 'Flash Floods in Chennai last November caused economic losses of $2.2 billion.' *BS Reporter*, 30 March. Available at: https://www.business-standard.com/article/current-affairs/flash-floods-in-chennai-last-november-caused-economic-losses-of-2-2-billion-116033000611_1.html.

Cameron, E. (2008). 'Indigenous spectrality and the politics of postcolonial ghost stories.' *Cultural Geographies* 15 (3): 383-393.

Cormaroff, J. (2007). 'Ghostly topographies: Landscape and biopower in modern Singapore.' *Cultural Geographies* 14 (1): 56-73.

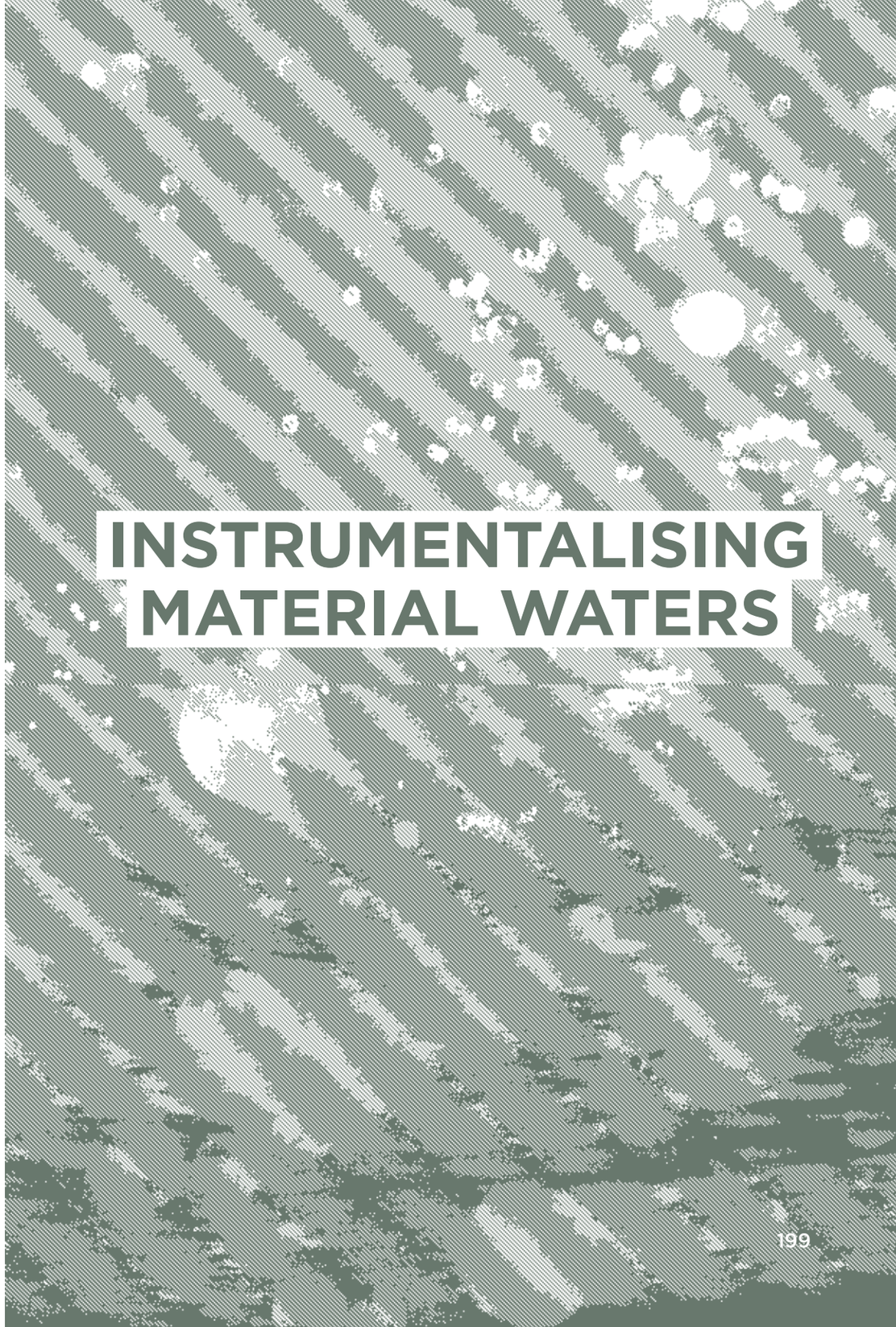
Crewe, L. (2011). 'Life itemised: lists, loss, unexpected significance, and the enduring geographies of discard.' *Environment and Planning D: Society and Space* 29 (1): 27-46.

Derrida, J. (1993). *Specters of Marx. The State of the Debt, the Work of Mourning and the New International*. London: Routledge.

Doctor, G. (2015). '"Water has its own memory": A diary of the 2015 flood.' *Scroll.in*, 20 November. Available at: https://scroll.in/article/770438/water-has-its-own-memory-a-diary-of-the-2015-chennai-flood.

Dutta, P. K. (2017). 'Why Chennai will keep choking, drowning with every spell of heavy rains.' *India Today*, 4 November. Available at: https://www.indiatoday.in/india/story/chennai-rains-floods-northeast-monsoon-tamil-nadu-1075745-2017-11-04.

e-flux. (2011). 'Animism. Modernity through the Looking Glass.' 14 September. Available at: https://www.e-flux.com/announcements/35141/animism-modernity-through-the-looking-glass/.
Giblett, R. (2016). *Cities and Wetlands: The Return of the Repressed in Nature and Culture*. London: Bloomsbury.
Giovannoni, E. and Quattrone, P. (2017). 'The Materiality of Absence: Organizing and the case of the incomplete cathedral.' *Organization Studies* 39 (7): 849-871.
Gopalakrishnan, S. (2017). 'What needs to be done to make Chennai flood free?' *Your Story*, 18 February. Available at: https://yourstory.com/2017/02/chennai-flood-free/.
Gordon, A. F. (1997). *Ghostly Matters: Haunting and the Sociological Imagination*. Minneapolis: University of Minnesota Press.
Govindarajan, V. (2017). 'Six Chennai maps spanning over a century explain why the city faces flood danger every year.' *Scroll.in*, 6 November. Available at: https://scroll.in/article/856756/six-chennai-maps-spanning-over-a-century-explains-why-the-city-faces-flood-danger-each-year.
Govindarajan, V. (2018). 'Decision to expand Chennai's city limits defies all principles of planning, say experts.' *Scroll.in*, 29 March. Available at: https://scroll.in/article/873074/decision-to-expand-chennais-city-limits-defies-all-principles-of-planning-say-experts.
Hatfield, D. J. (2011). 'The [Ghost] Object: Haunting and Urban Renewal in a "Very Traditional Town".' *Journal of Archaeology and Anthropology* 75: 71-112.
Irvine, R. (2016). 'East Anglian Fenland: Water, the Work of Imagination, and the Creation of Value.' In: Hastrup, K. and Hastrup, F. (eds.) *Waterworlds: Anthropology in Fluid Environments*, 23-45. New York: Berghahn Books.
Jayaraman, S. (2015). 'Chennai floods are not a natural disaster – they've been created by greedy town planners and dumb engineers.' *Quartz India*, 2 December. Available at: https://qz.com/india/563396/chennai-floods-are-not-a-natural-disaster-theyve-been-created-by-greedy-town-planners-and-dumb-engineers/.
Kwarteng, K. (2011). *Ghosts of Empire: Britain's Legacies in the Modern World*. London: Bloomsbury.
Lakshmi, K. (2018). 'The vanishing waterbodies of Chennai.' *The Hindu*, 1 April. Available at: https://www.thehindu.com/news/cities/chennai/the-vanishing-waterbodies-of-chennai/article23404437.ece.
Lakshmi, K. (2017). 'In parched city, borewells proliferate, go deeper.' *The Hindu*, 12 May. Available at: https://www.thehindu.com/news/cities/chennai/in-parched-city-borewells-proliferate-go-deeper/article18433642.ece.
Lanchester, H. V. (1918). *Town Planning in Madras: A Review of the Conditions and Requirements of City Improvement and Development in the Madras Presidency*. London: Constable & Company.
Lopez, A. (2015). 'Chennai floods: Over 50,000 houses of low income group damaged.' *The Hindu*, 8 December. Available at: https://www.thehindu.com/news/cities/chennai/over-50000-houses-of-low-income-group-damaged/article7959676.ece.
Maddern, J. F. and Adey, P. (2008). 'Editorial: spectro-geographies.' *Cultural Geographies* 15 (3): 291-295.
McEwan, C. (2008). 'A very modern ghost: postcolonialism and the politics of enchantment.' *Environment and Planning D: Society and Space* 26 (1): 29-46.
Morrison, K. D. (2014). 'Capital-esque Landscapes: Long-Term Histories of Enduring Landscape Modifications.' In: Hakansson, T. and Widgren, M. (eds.). *Landesque Capital: The Historical Ecology of Enduring Landscape Modifications*, 49-74. New York: Routledge.
Muir, J. (2003). 'Now and then, neoliberalism and the spectre of history.' *Dissent* 12: 56-58.
Nagendra, H. (2016). *Nature in the City: Bengaluru in the Past, Present and Future*. New Delhi: Oxford University Press.
Nurullah, A. (2017). 'With no law in place, tankers raid villages, plunder farms of water.' *Times of India*, 3 July. Available at: https://timesofindia.indiatimes.com/city/chennai/with-no-law-in-place-tankers-raid-villages-plunder-farms-of-water/articleshow/59417449.cms.
Parthasarathi, P. (2017). 'Water and Agriculture in Nineteenth-Century Tamilnadu.' *Modern Asian Studies* 51 (2): 485-510.
Radhakrishnan, S., Selvan, K. G. and Kumar, S. (2017). 'Collapse of Trust – Moulivakkam Twin Towers.' *International Journal of Research in Business Studies and Management* 4 (1): 37-46.
Saranathan, ?. (2015). 'Lost Lakes of Chennai.' J*ayasreesaranathan.blogspot.com*, 24 August. Available at: http://jayasreesaranathan.blogspot.com/2015/08/lost-lakes-of-chennai.html.
Sengupta, S. (2015). 'Why Chennai floods are a manmade disaster.' *Down to Earth*, 4 December. Available at: https://www.downtoearth.org.in/news/natural-disasters/why-chennai-floods-are-a-man-made-disaster-51980.
Shekhar, L. (2018). 'Chennai expansion to Kancheepuram and Tiruvallur. Why citizens should be concerned.' *Chennai Citizen Matters*, 28 April. Available at: http://chennai.citizenmatters.in/cmda-chennai-expansion-kancheepuram-tiruvallur-4614.
Shivakumar, C. (2018). 'By 2020, Chennai to run out of groundwater: Niti Aayog.' *New Indian Express*, 17 June. Available at: http://www.newindianexpress.com/cities/chennai/2018/jun/16/by-2020-chennai-to-run-out-of-groundwater-niti-aayog-1828894.html.
Sreenivas, J. (2014). '11 floors went up on wetland in Chennai until one fell, killed 60.' *The Indian Express*, 4 July. Available at: https://indianexpress.com/article/india/india-others/11-floors-went-up-on-wetland-in-chennai-until-one-fell-killed-60/.
Sriram, V. (2014). 'Locating a lost lake of Madras.' *The Hindu*, 6 June. Available at: http://www.thehindu.com/features/metroplus/society/locating-a-lost-lake-of-madras/article6089792.ece.
Special Correspondent. (2018). 'Residents oppose expansion of Chennai Metropolitan Area.' *The Hindu*, 24 April. Available at: https://www.thehindu.com/news/cities/chennai/residents-oppose-expansion-of-chennai-metropolitan-area/article23651619.ece.
Times of India. (2015). 'Borewells often mean deep trouble.' 23 June. Available at: https://timesofindia.indiatimes.com/city/chennai/Borewells-often-mean-deep-trouble/articleshow/47778659.cms.
Tsing, A. Swanson, H., Gan, E. and Bubandt, N. (2017). *Arts of Living on a Damaged Planet. Ghosts and Monsters of the Anthropocene*. Minneapolis: University of Minnesota Press.
Williams, M. (2009). *The Draining of the Somerset Levels*. Cambridge: Cambridge University Press.
Wylie, J. (2007). 'The spectral geographies of W.G. Sebald.' *Cultural Geographies*, 14 (2): 171-188.
Zaheter, M. (2016). *Epidemics, Empire, and Environments: Cholera in Madras and Quebec City, 1818-1910*. Pittsburgh: University of Pittsburgh Press.



INSTRUMENTALISING MATERIAL WATERS

NEPAL'S WATER FOR THE PEOPLE'S INVESTMENT? THE PROMISE OF SHAREHOLDER CITIZENSHIP IN A HYDROPOWER NATION

Matthäus Rest is a social anthropologist interested in the relations beween the environment, the economy and the future. In his PhD thesis, he dealt with the ramifications of an unbuilt hydropower project in Nepal. His current research is concerned with peasant dairying bacteria and the fermentation collectives that sustain them.

10,000 megawatts in 10 years

This time, sneaking in was more difficult than usual. Whereas normally being white would shield me from being asked for any form of legitimation at hydropower related meetings in Nepal, this time, I had been told in advance, proper accreditation was required. After all, this time was special. The banner of the Power Summit 2016 self-confidently proclaimed the goal of the two-day event: '10,000 megawatts in 10 years.' Arriving ten minutes late, I was presented with the next surprise: the program had started on time and I barely managed to slip inside the ballroom before a former Miss Nepal asked Prime Minister Puspha Kamal Dahal to inaugurate the Summit. What followed were panels with the most important players of the private hydropower industry and the public sector, and the ambassadors of the most influential foreign powers.

Much less numerous, however, were the contributions and participation of those who seemed to be the target audience of the event: foreign investors. One British gentleman gave an enthusiastic speech about why he decided to invest in Nepal's hydropower future, but also failed to present a convincing argument as to exactly why. During lunch break it became painfully obvious that the overwhelming majority of the foreigners present were representatives of the usual suspects: employees of the international development banks and DAC donor agencies. This fact was not lost on one Nepalese interlocutor and industry insider who told me 'When they do something like this in Cambodia, dozens of potential investors show up, mostly Chinese but also from other countries. Here, today, it's maybe five new investors among 400 attendees.'

All of this happened in December 2016, during the first winter in over a decade that did not see hours of daily rolling brownouts, euphemistically called loadshedding, in the capital. Nepal is highly dependent on its rivers for the production of electricity. The volume of those rivers, however, is fluctuating wildly. Due to the monsoon, about half of the annual precipitation falls on just fifteen days while in the eight months between October and May there is hardly any rain at all. Additionally, Nepal currently has only one reservoir dam and otherwise relies on run-of-the-river plants. The combination of all these factors

lead to a huge discrepancy between potential summer production of electricity and the 'firm energy' that can be produced on a normal day in December.

Fig.01 For over a decade, the Nepal Electricity Authority had assigned each neighbourhood into one of seven groups and issued detailed loadshedding schedules that would change every six to eight weeks. Copyright: ktm2day.com.

Still, for decades the political elite, often in concert with the western donor community has promised the people of Nepal development through hydropower. Once the untapped potential of the country's rivers has been harnessed, the profit from exporting this electricity will turn Nepal into the 'Switzerland of Asia.' In this vein, in 2017 a new 400kV trans-border transmission line intended for the export of electricity to India came online. The inauguration of this line was however the main reason for the end of the daily rolling brownouts as it was used to import 160 MW of electricity from the southern neighbour (Subedi, 2017).

In a century of hydropower development only about 800MW of capacity have been installed. Still, there was no critique about the continuous repetition of the spectacular refrain of '10,000MW in 10 years' at the Power Summit. On the contrary, throughout its deliberations, participants engaged in elaborate games of 'counting up the future' by listing their favourite projects, adding their capacities and reassuring each other that 10,000MW was an ambitious number, but in no way impossible. In fact, the use of spectacular numbers also has a long history in Nepal's hydro discourse, going back at least to the 1960s when Hari Man Shrestha (1966) calculated the country's hydropower potential to stand at 83,000MW. Despite the lack of reliable hydrological data on most river systems, this number has remained unchallenged and has become so powerful that if you are hiking in the Nepalese Himalayas, several days away from the last transmission pole and happen to meet a group of school children along the trail, they will be able to tell you that the country's hydropower potential is 83,000 MW.

Accordingly, the only major controversy at the Power Summit was about a different numbers game: the demand forecast presented by the head of the power trade department of Nepal's Electricity Authority (NEA). This was not a new controversy. For years, the private sector has been accusing the state NEA to underestimate the actual demand in the country. Because of the decade of daily power cuts, the circular argument of the hydro industry goes, people are using much less energy than they would in a situation of uninterrupted supply. Therefore, paradoxically, the fact that the NEA's demand forecast started from the actual energy situation in the country rendered it unrealistic in the eyes of the private sector.

Fig.02 A private water tanker in Kathmandu. Matthäus Rest, 20 March 2016.

Despite this major disagreement both the state and private actors see the current situation as crisis. For the fourth time in eight years, in 2016, the Government of Nepal declared a national energy crisis. To end electricity scarcity, it proposed a 'National Energy Crisis Reduction and Electricity Development Decade' under the slogan Nepalko pani janatako lagani or 'Nepal's Water [for] the People's Investment.' Strongly connected to this slogan is the idea that currently Nepal is not only wasting its potential to capitalise on its rivers, but that it also fails to create investment opportunities for the vast amount of remittance money flowing back into a country where investment opportunities are scarce. Already at the 2013 Power Summit, an industry spokesperson aptly summarised that connection: 'Not one drop of water should flow beyond Nepal's borders without creating wealth' (Lord, 2016).

In February 2018, shortly after the Power Summit, the Department of Energy launched an online crowdfunding platform under the same motto – *Nepalko pani janatako lagani* – with the aim of encouraging citizens and institutions to invest in the future of the self-proclaimed hydropower nation. After a week, national media reported an enthusiastic response: the platform had raised 1.5m US-Dollars in only three days. Since then, however, I have not seen any further updates on the scheme, nor has the ministry specified which projects would be funded through the initiative or the terms of the investment. Recently the government has enacted legislation that requires private developers to set aside five percent of any new built project's shares for 'project-affected' people in exchange for a power purchase agreement with NEA that has a monopoly on electricity distribution. This shareholder model emerges as part of a new regime on how to compensate affected communities framed by the idiom of 'benefit sharing.' It is through these futures that the promise of citizenship of a future hydropower nation is actualised.

Questions of Volume

Looking at all those refrains, I recently realised that they all are essentially concerned with a cascade of volumes, volumes of different sorts and opaque qualities. First and foremost. and in line with colonial conceptions of rivers as volumes (D'Souza, 2017), those spectacular refrains rely on Nepal's rivers and reconceptualise this imagined national body of water as an untapped reservoir for future wealth. Out of this rationale emerges a double movement of securing these volumes: on the one hand the attempt to secure - or territorialise - the potential physical sites for hydropower projects and on the other hand the attempt to securitise the financial assets necessary to develop these projects. But while both the territorialisation and the financialisation of Nepal's water depends on the volume of its rivers, there are hardly any reliable hydrological data on them. All we know is that the vast majority of these rivers originate on the southern slope of the Himalayas and therefore carry extremely different volumes during wet and dry seasons.

I understand the other refrain, '10,000MW in 10 years' as a volumetric claim too. Even in the unlikely event of reaching the stated goal, it is in no way clear what 10,000MW would mean in terms of actual electricity produced. This again stands in direct relation with the seasonality of water. Technically the number refers to an installed capacity, that is, nothing but a potential. Under ideal conditions, a capacity of 10,000MW will yield 10,000MWh of electricity in one hour, but no hydropower plant in the world reaches this efficiency of a 100% capacity factor. In the case of Nepal, similarly to the capacity factor of the already existing hydropower projects, experts estimate that during the dry season hardly more than a third of the installed capacity will be produced. Many in the hydropower industry have understood this dilemma and are advocating a move away from run-of-the-river plants and towards the construction of large storage facilities (as can be seen from the recent discussion on the Buddhi Gandaki project) (Subedi, 2018). This, however, is not a new discussion. Already in the 1980s, major construction companies from Europe and the USA had an eye on Nepal's untapped reservoir potential, but eventually lost interest when they realised the colossal complexity of building large infrastructure projects in Nepal. The entanglement of complicated geology, seismology, logistics, politics and institutions has proven to be highly recalcitrant to the actualisation of the planner's visions (Rest, 2018). In ideal conditions, from a developer's perspective, Nepal would use the summer's excess energy to pump water into large reservoirs. Similar to the situation in the Alps, this back-up water could then be used to cover peak hour demand during winter.

In recent years we can sense an ever-growing interest to move beyond two-dimensional representations of sovereignty. Eyal Weizman's (2007) work on Israel's occupation of the West Bank and the Gaza Strip impressively shows the importance to consider both the underground and the airspace for any project of state-making. The denial of Israel's government to cede control over these two domains to Palestinian authorities rendered even the idea of Palestinian sovereignty illusionary and resulted in a 'hollow' land that would only be surface. This 'politics of verticality' is especially pertinent when it comes to the control of water and sewage. Building on this insight, Stuart Elden (2017: online) argued that contrary to the conventional focus on state borders, 'territory more properly extends through the fabric of the state and can only be grasped as volume.' Thinking Nepal's territory through its water volumes reveals a highly fragmented sovereignty that is increasingly encroached upon by its two powerful neighbours. One place where this race for the control over Nepal's rivers is very obvious is the upper Arun valley.

Arun-3: The Dam that's always late

The most significant river with a large trans-Himalayan catchment area is the Arun in the country's east. It has a far higher minimum volume than the other rivers and has been one of the most important sites of Nepal's hydropower frontier, despite its remote location even in Nepalese terms. But even for the Arun there is no reliable data on the amount of water coming from Tibet as a recent conversation with the hydrologist Katalyn Voss confirmed. For a few years now, an Indian developer has been paying local people to keep track of the amount of water passing through the village of Doban, the proposed dam site for the Arun-3 hydropower project. Not surprisingly, I so far failed to convince the company's employees to show me their records.

Fig.03 The proposed Arun-3 dam site between Num and Hedangna. Matthäus Rest, 3 Feb 2015.

While the rivers of Nepal are full of unbuilt hydropower dams, Arun-3 is by far the most famous of them. Originally identified as the best site in the whole Kosi basin by a Japanese feasibility study and taken up by a consortium of Western donors in the 1980s, the project was cancelled in 1995 after the World Bank got into trouble with the global anti-dam movement and stopped all hydropower funding for a few years. In 2008 the government of Nepal signed a Memorandum of Understanding with SJVN, an Indian state-owned public service undertaking to construct the project. This was one of the first actions of the transitional government right after the end of the decade-long armed conflict between the state and the Maoist People's Liberation Army.

The project design is practically identical with the previous iteration, except for one major difference that again brings us back to the seasonality of volumes: the installed capacity will be increased from 400 to 900MW. In light of the vast contractual differences between the two attempts, this makes sense from the developer's perspective. While the first Arun-3 was an attempt to secure the national power demand, the new project will be built and owned by a foreign company. For thirty years SJVN will export 78.1% of the generated electricity to India. And while Nepal's major problem with electricity is in the winter, North India

Fig.04 A view of the Arun valley looking north towards the Chinese border. The proposed Arun-3 reservoir lake will be in the centre of the picture. Matthäus Rest, 2 Nov 2010.

needs most power in the summer when it is hottest.

A similar agreement about the second most promising project site in the country was reently awarded to another Indian corporation. Not surprisingly, given the current energy situation and the close connection between water resources, nationalism and the promise of future wealth, these contracts have drawn fierce criticism from water experts, activists

and the political opposition - whichever parties that might be at any particular moment. Many of them accuse India of neocolonial ambitions and use the case of Bhutan as a negative example. There, India has established a de facto monopoly on hydropower extraction. Confronted with these accusations, the Indian engineers working on the Arun-3 project counter with the argument that no other Build-Own-Operate-Transfer contract in the world is so favourable for the host country; which might actually be true. In their narrative, Arun-3 becomes development aid with different means: 'We are a state-owned company therefore we are not restricted by purely economic logics. We want our neighbours to develop too,' one of them told me.

Another reason for the sweet deal might be the fact that the Arun valley is one of only a handful of easy passages through the Central Himalayas and the proposed dam site is only 20 miles south of the Chinese border. In securing this location, the geopolitical aim to keep China at bay conflates with the long-established obsession of the Indian water bureaucracy to control the Ganges's headwaters as far upstream as possible. The recent announcement of Indian Prime Minister Narendra Modi that his government will not buy Nepal's hydroelectricity if China will be building the dams in question clearly shows the red line for India's self-proclaimed benevolence. After many delays, in May 2018 the two Prime Ministers officially laid the foundation stone.

The families who will lose land to the scheme have been offered very generous compensation packages. Additionally, and in line with the new regime of community-based compensation through benefit sharing, 1.5 % of the shares have been earmarked for 'project affected people' along with 30kWh of free electricity per household and a non-binding commitment towards skills development and employment opportunities for local people. The former CEO of the Nepalese subsidiary of the Indian developer, however, told me: 'Tell your friends not to buy those shares. In this particular project, the government has gotten such a good deal that private small-scale investors will not make any profit on their investment.' Given the positive example of the first hydropower project that went public including a 'local' shares option in Central Nepal a few years ago, I doubt that they will heed my advice. To many of my indigenous interlocutors in the Arun valley the opportunity to buy shares in the project is much more than just an investment. It is the promise of becoming citizens of the emerging hydropower nation. With the disappointments of the post-war peace process and the promulgation of a highly reactionary new constitution, this is probably all indigenous communities in the mountains of Nepal can hope for at the moment.

REFERENCES

Elden, S. (2017). 'Terrain.' *Theorizing the Contemporary, October* 24. Available at: https://culanth.org/fieldsights/1231-terrain.

D'Souza, R. (2017). 'Pulses against Volumes: Transboundary Rivers and Pan-Asian Connectivity.' In: Farell, K. S. and Ganguly, S. (eds.). *Heading East: Security, Trade, and Environment between India and Southeast Asia*, 241-253. Oxford: Oxford University Press.

Lord, A. (2016). 'Citizens of a hydropower nation: Territory and agency at the frontiers of hydropower development in Nepal.' *Economic Anthropology* 3: 145-160.

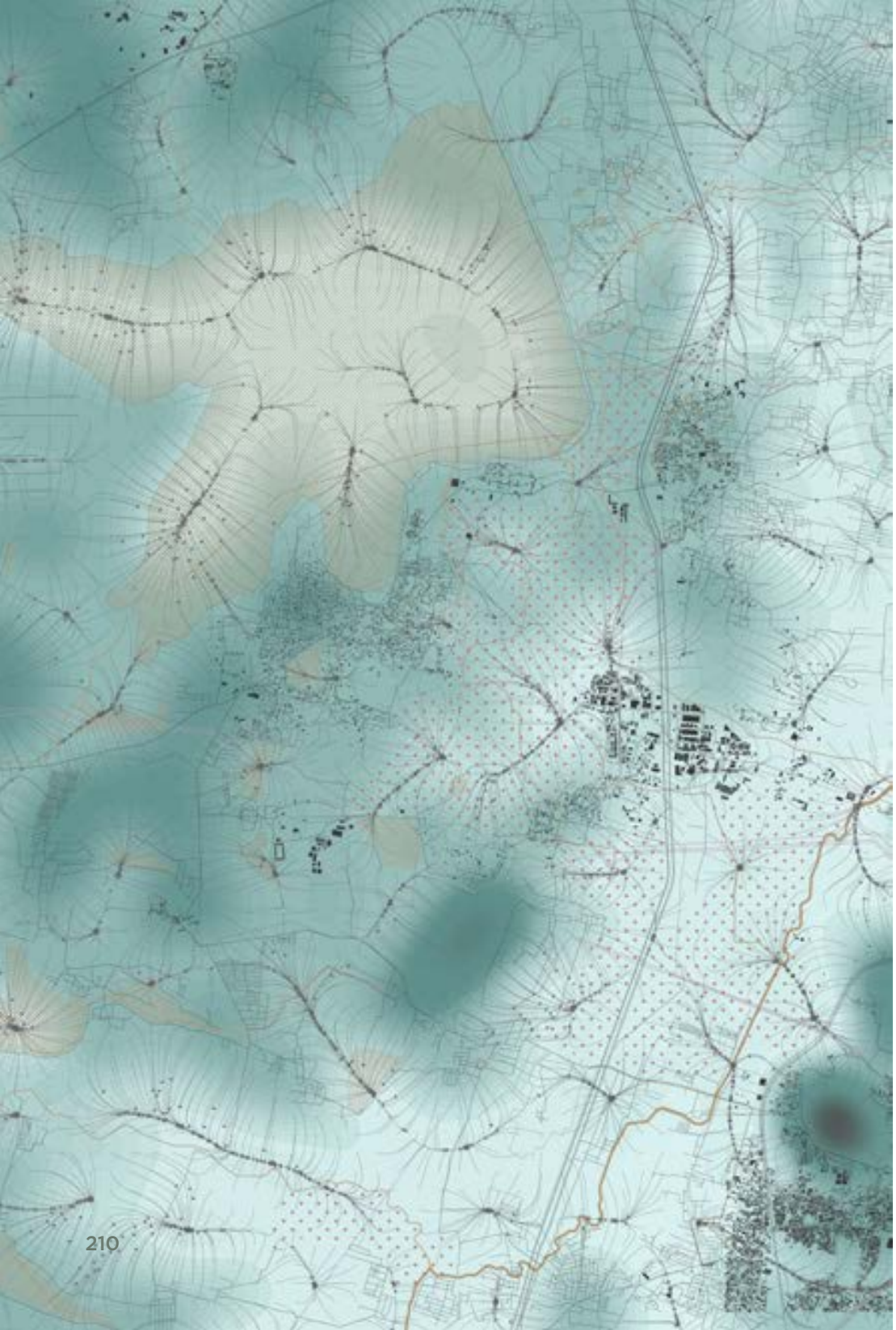
Rest, M. (2018). 'Dreaming of Pipes: Kathmandu's long delayed Melamchi Water Supply Project.' *Environment and Planning C: Politics and Space*. Available at: https://journals.sagepub.com/doi/full/10.1177/2399654418794015

Shrestha, H. M. (1966). 'Cadastre of potential water power resources of less studied high mountainous regions, with special reference to Nepal.' PhD. Thesis. Moscow Power Institute.

Subedi, B. (2017). '60 MW power deal signed: NEA.' Available at: http://kathmandupost.ekantipur.com/news/2017-05-28/160-mw-power-deal-signed-nea.html.

Subedi, S. (2018). On Budhi Gandaki, Nepal should say no to India and China. Available at: http://www.recordnepal.com/wire/features/on-budhi-gandaki-nepal-should-say-no-to-india-and-china.

Weizman, E. (2007). *Hollow Land: Israel's Architecture of Occupation*. London: Verso.



STORING MONSOON WATERS: THE TANK SYSTEMS OF TAMIL NADU

Ranee Vedamuthu is currently the Professor and Dean, School of Architecture and Planning, Anna University, Chennai. She has been part of academic council of notable colleges and has guided the development of architectural curriculum for these institutions. She is the recipient of Honourable teachers Award from the Indian Institute of Architects and is the nominee of the Tamilnadu state government to the Council of Architecture, New Delhi. She has been the Anna University co-ordinator for the ARCUS project funded by the Ministry of Foreign affairs, Region Centre Val de Loire. She is an active researcher having guided several research scholars. She is also a consultant of many prestigious architectural design projects.

R.H. Rukkumany is working as Associate Professor and co-ordinates the Masters programme in Landscape Architecture at the Department of Architecture, School of Architecture and Planning, Anna University, Chennai. She is pursuing her PhD on traditional water management systems of Tamilnadu with reference to land use change of common lands. She has been the recipient of Erasmus Mundus Scholarship under the India4EUII programme and research scholarship under the ARCUS project funded by European Union. Her area of interest is traditional landscapes, especially of Tamil Nadu and ecological planning that considers local, vernacular and cultural aspects.

Introduction

Brimming with water for a few months of the year and appearing as a dry parched sandy depression in the land for the rest, tanks are the ultimate expression of the monsoonal cycles of wetness and dryness. Just as the heat from the rising temperature is a precursor to the monsoon, the tank has to be dry and empty to hold its pouring waters. So what happens when the tanks are perceived as waste land and filled?

The northeast monsoon unlike its counterpart the southwest monsoon is not reliable. It produces either too much rain or too little rain. When the waters descend in torrents and a year's average of rainfall pours down in a couple of days, it is obvious that there will be floods and droughts. These are not really opposites in this climate, they follow one another. A good year or a few good years of the monsoon may be followed by many years of insufficient monsoon rain. In the coastal tracts of Tamil Nadu, this seeming duality of overflowing and parched landscapes has enabled a way of life that has existed by storing monsoon rain. Storage tanks are an intrinsic part of this landscape, linked with the society that sustains and is sustained by them. This forms a complex natural and socio-economic system. This system has sustained agriculture and life for a long time in Tamil Nadu. However various factors have led to the decline of the system by undermining the linkages that sustained it. This paper describes the components of the system, the

P206 Hydrological flows, Chennai. Tom Benson, 2018. Software: Open Street Map, Rhino, Grasshopper, Nudibranch.

inter-relationships that exist between the various components and the ways in which the system has been disturbed.

The Tanks of Tamil Nadu

The storage of water becomes critical for societies dependent on rain as their primary source of supply, as is the case in most parts of India. Water management in India till the 19th century was predominantly at a local and regional scale. Before the construction of dams during the colonial period and after independence during the 1950's, most water storage and distribution was through small localised structures, except in the regions watered by large perennial rivers (Vaidyanathan, 2001). The majority of these were surface storage structures which, in the 1950's, served to irrigate forty percent of the total area served by surface irrigation (ibid.). In fact there were 750,000 so called minor irrigation structures in the country and approximately 700,000 of these were in use till the 21st century (ibid.).

Fig.01 Classification of tanks and their names in Tamil Nadu. Vedamuthu and Rukkumany, based on Weiz (2005) and observations in the study area.

In the State of Tamil Nadu, these surface storage structures take the form of reservoirs called tanks, whose area extends from a few hundred sq.m to thousands of sq.m. The term tank itself comes from Portuguese *tanque* and from the Latin *stagnum* (Ariza, Galan and Serrano, 2013). This term refers to a wide variety of reservoirs which have specific names and functions in the local understanding. (Fig.01).

In the southern part of India, rulers excavated tanks from the medieval period onwards (Ludden, 1985 as quoted in Pandey, 2000). As a result, the three southern states Tamil Nadu, Karnataka and Andhra Pradesh account for sixty percent of the total tank irrigated areas in the country (Vaidyanathan, 2001; Seenivasan, 2002). In these states, tanks are not evenly distributed, but found in concentrated areas. They have found wide mention in literature and have been upheld as the solutions for drought and floods in recent times. Especially in context of Chennai, the restoration of tanks is considered to be the solution for perennial water problems. There are hundreds of such tanks in the peri-urban regions of Chennai. More importantly the three rivers that drain the city, the Kosathalayar, Cooum, and Adyar, are dependent on the overflow from numerous tanks located in their catchment areas. The combined overflow of these tanks is considered to be one reason for the floods that happened in 2015. The peri-urban areas of the city where the main sources of water are located are also the victims of development, due to their proximity to the city. This paper focuses on how this development has affected the tanks in these regions, especially with reference to the conversion of the lands related to the tanks and how this conversion has impacted them.

Study area and methodology of study

The Adyar River watershed is located in the Chennai, Kancheepuram and Thiruvallur districts of Tamil Nadu (Fig.02). The Adyar is an ephemeral river, whose catchment area includes Chennai and its metropolitan periphery. Thirty-nine percent of its watershed lies within the Chennai Metropolitan area, with sixty-one percent in the neighbouring districts of Kancheepuram and Tiruvallur (Vanaja, 2013). About 200 tanks in the Chennai metropolitan area discharge their surplus water into it (Bharadwaj et al., 2014). The Adyar watershed has four sub watersheds: the Thirusoolam, Orathur, Manimangalam and Dasarikuppam. Of this, the major part of the Thirusoolam sub watershed lies within the Chennai metropolitan area boundary and the other three sub watersheds are located in the Thiruvallur and Kancheepuram districts. Tanks located in these three watersheds were taken as case studies for this paper.

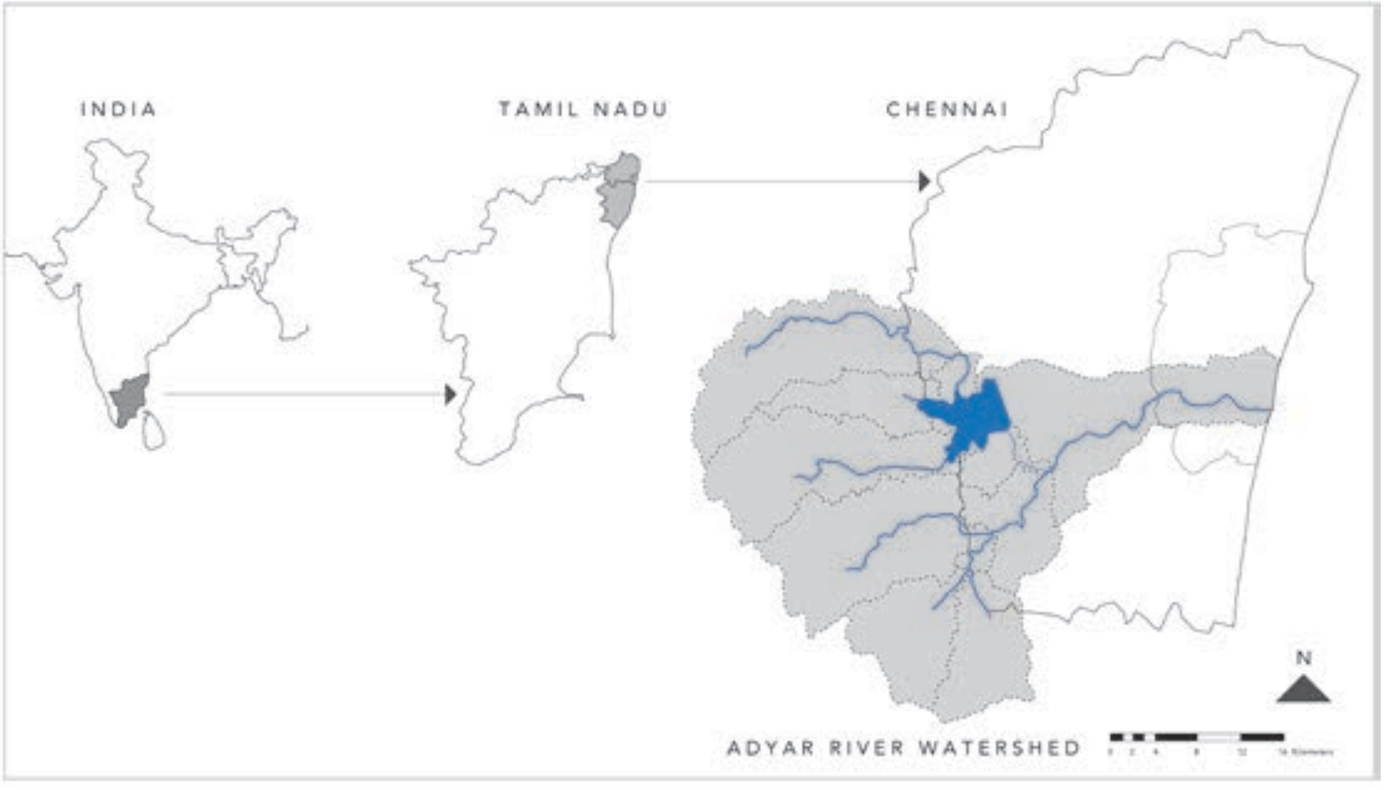


Fig.02 Location of the study area, the Adyar River watershed. Vedamuthu and Rukkumany.

The selection of the tanks was based on comparison of satellite images from the year 2005 and 2010. These were the tanks in which either the area of the tank was reduced or the water storage area in the tank had been reduced. This was followed by on site study of these tanks to identify the causes of this decline or preservation. Preliminary surveys and unstructured interviews in the study area lead us to explore the role of common areas in the village known as *puramboke*. As these common lands were part of the land use system, land use records of the villages of which the tanks were a part were collected and mapped. An analysis of the factors of decline and their causes pointed towards land use change as an important factor. Based on the case studies, the pathways of the direct and indirect impact of the land use change were drawn. A review of literature about the changes in the land use system in that past was undertaken to identify causes and impacts. Other than complex socio-economic impacts due to the administrative changes in the past, the most dominant factor causing land use change and thereby affecting the tanks and the water management system was urbanisation. Therefore the analysis focused on this factor and how it has affected the tanks.

Tanks as appropriate devices for water storage in the study area

In Tamil Nadu, of the tank irrigated areas, eighty percent fall within only three districts. These districts are found in the coastal areas (Ratnavel and Gomathinayagam, 2006). The prevalence of tanks in these districts is due to topography, geology and rainfall distribution (Vaidyanathan and Subramanian, 2001).

The coastal areas receive the major portion of their rainfall from the north east monsoon or during the summer (Fig.03), both of which periods are characterised by cyclones and intense rainfall in short bursts. The overall gradient or slope of the topography is low (Fig.04). These two factors necessitated the creation of storage structures to hold monsoon rain and make it available for use throughout the year. Such

conditions facilitated the storage of rainwater in small, shallow storage tanks (Seenivasan, 2002). The tanks performed the dual function of alleviating both floods and droughts.

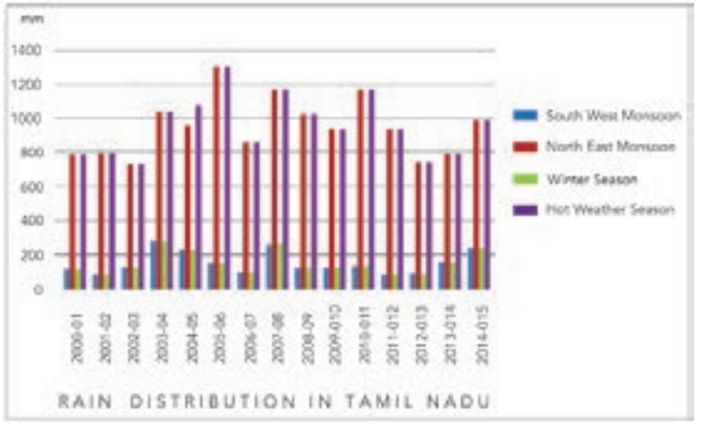


Fig.03 Graph of rainfall distribution in Tamil Nadu. Vedamuthu and Rukkumany, based on data from the Department of Economics and Statistics, Tamil Nadu, 2017.

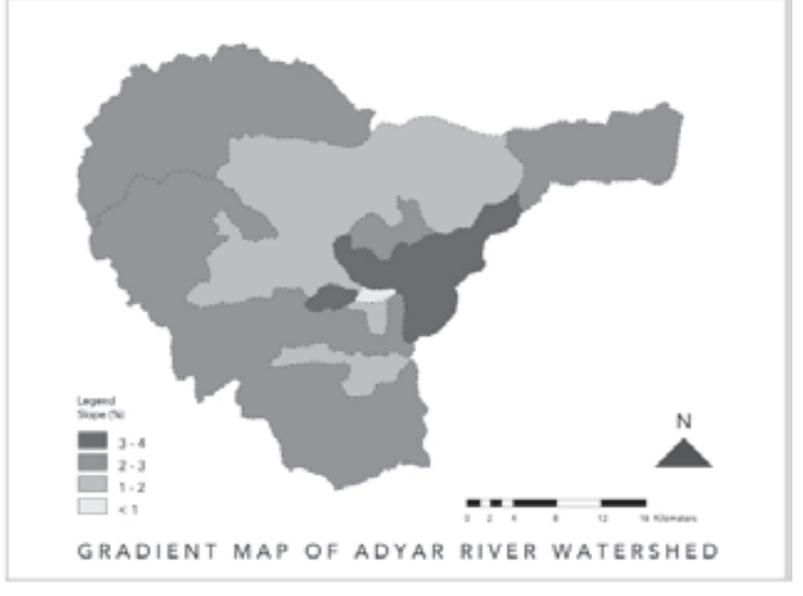


Fig.04 Gradient map of the Adyar River watershed. Institute for Remote Sensing, Anna University, Chennai.

Tanks as *Puramboke* (common land)

Land in the villages of Tamil Nadu was divided into two major classifications: agricultural land and common land, called *puramboke* in Tamil. (Fig.05) gives the land classification system that was used. Puramboke lands were a significant part of the total land in the village. The land on which tanks were located, as well as their bunds, foreshore areas, inflow and outflow channels and all other components of the tank system were classified as *puramboke* lands. (Fig.05) gives the list of puramboke lands related to water management. *Puramboke* lands were therefore essential to the survival of the tanks. To perform this role it was important that they were not utilised for other purposes than intended.

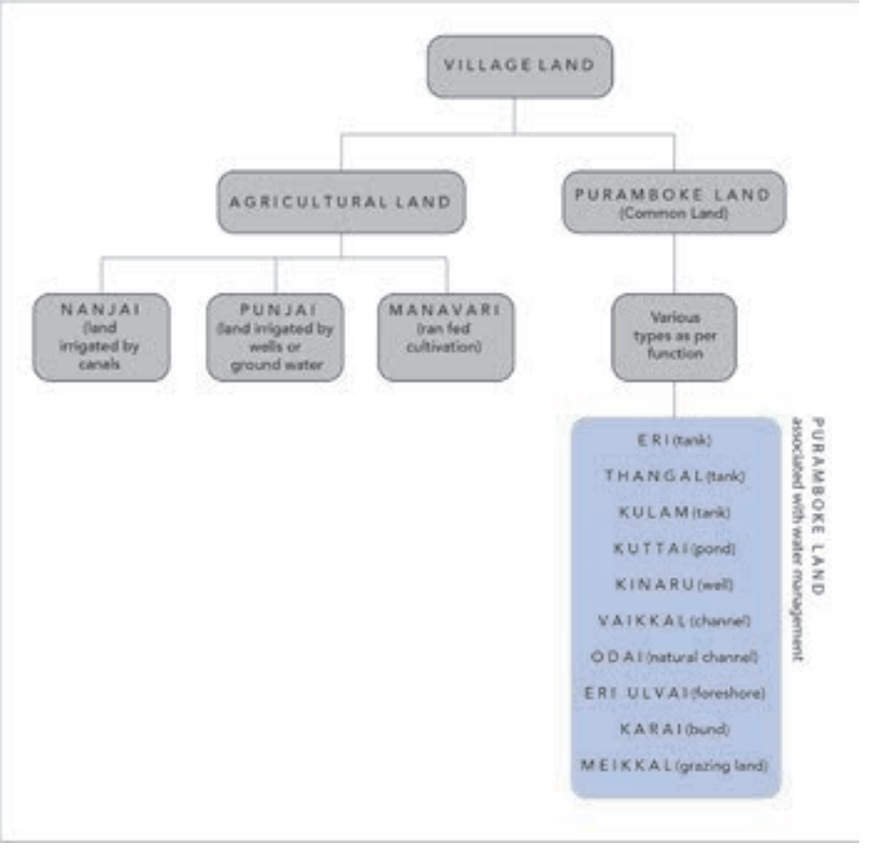


Fig.05 Classification of land and types of puramboke land associated with water management in the villages of Tamil Nadu. Vedamuthu and Rukkumany, based on data from land records of the revenue department of the Sriperumbudur Taluk, Kancheepuram District, Tamil Nadu.

Tanks are fragile structures, which require constant maintenance, care and protection. They are shallow water bodies that can be easily silted over if de-silting is not periodically undertaken and their materiality is highly vulnerable to weathering. The earthen bund can easily breach with a single season of heavy rainfall when not stabilised by vegetation. Hence the foreshore of tanks was traditionally wooded with trees and other vegetation. Frequently these were considered sacred groves, thus protecting them from damage. This wooded area in the foreshore protected the tank by arresting debris and by reducing the speed of runoff. The channels, another component of the common lands are an important part of the tank system. They not only bring water from the tanks upstream but other channels disperse the overflow to the next tank in line once the tanks are full. Without the channels speedily removing overflow water, the tanks breach by breaking the earthen bund, which causes flooding immediately and drought in the long term as water will not be stored in the tank. These channels have also to be maintained regularly and protected from encroachment. As most of these channels carry water only when there is rain and remain dry at all other periods of the year, they are vulnerable to encroachment. Any changes to these protective structures will result in damage to the tank and eventually the decline of the water management system (Vedamuthu and Rukkumany, forthcoming).

Changes to the system and the impact of urbanisation

Chennai is dependent on its peri-urban areas for its water. It is in these areas that there is also large development of Industries. The Tamil Nadu state government has an active policy for developing industries and many industrial zones were set up in the peri-urban zones of Chennai, for example the SIPCOT industrial zone at Irrungattukottai and the SEZ in Mannur in the study area. In addition to this industrial policy, the economic growth of Chennai has led to demand for land to be used for housing and other purposes. The resulting urbanisation has had a large impact on water resources. The impact is both due to the direct causes discussed above and indirect causes arising from them. The setting up of industries has led to the acquisition and conversion of agricultural land, leading to the decline in agriculture and dependency on tanks for irrigation. With the reduction or complete loss of agricultural activity, the need to protect and conserve tanks was lost. Further, when land in a village was acquired for the purpose of setting up an Industrial zone, the ownership of common lands of that village was transferred to the industrial estate. This was done as *puramboke* lands are considered to be government land and are frequently classified as wasteland. Some of the larger tanks like eris are protected, but most of the channels, grazing lands and the smaller ponds are not and have often been misused. Industries have dumped waste in tanks and channels, resulting in severe encroachment. The obstruction of channels has prevented water from reaching the tank and also led to inadvertent flooding. Industries draw water through wells, bore-wells and the use of pumps. In addition, in the peri-urban area, water has become a commodity. Due to the huge demand of water from the city, many bottling plants were set up in the study area. Both private industries as well as the city's water supply board entered into contracts with farmers to withdraw water from their tanks and lands. The withdrawing of water for this purpose exhausted the aquifers, thereby drying up the tanks. The dry bed became a victim for illegal occupation for various purposes including housing, which in turn became the driver of further development in the area. The roads that were constructed to provide fast access obstructed channels in many places and even cut across tanks. They also attracted further development due to increased accessibility. Insensitive construction of these highways and major roads compounded the problem. Many roads are at a elevated level from the surrounding areas, inadvertently becoming obstructions for the flow of water. These direct and indirect impacts of land use change due to urbanisation are outlined in (Fig.06).

Fig.06 Impact of urbanisation on water resources. Vedamuthu and Rukkumany.

Conclusion

The functioning of Tamil Nadu's tank-based water management system was dependent on the availability of common *puramboke* lands. In certain cases, such as the water storage areas known as *eri puramboke*, the connection is immediately apparent, but the importance of the other common lands such as *vaikkal puramboke* (channels) or *eri ulvai* (foreshore areas) is not clearly understood or established. Protecting tanks individually as the different policies and laws have done had only limited success. Even though *puramboke* lands are protected by law, they are not in good condition. They are frequently converted to other purposes legally or illegally. In the case of vegetation in these lands there is no effort to protect it or to revive it when it is damaged. The channel network is the other component that has suffered great damage in the study area. Just as heat from the rising temperature is a precursor to the monsoon, so the tank has to be dry and empty to hold its pouring waters. Channels have to be unencumbered to bring flood waters to the tanks and to take the overflow from the tanks to the next one in line. The foreshore has to be vegetated and the bund has to be stabilised with vegetation. Only with the protection of these common lands explicitly through policy and active measures can the tanks hold the monsoon waters as they are meant to. Alleviation of both floods and drought is dependent on that.

NOTES

01 The Chennai Metropolitan Area (CMA) has an area of 1189 sq.kms and has within itself 16 municipalities, 20 town panchayats and 214 villages in addition to the area falling under the Chennai City Corporation (Chennai Metropolitan Development Authority, 2015).

REFERENCES

Ariza, P., Galan, E. and Serrano, T. (2013). 'Water tanks as ecosystems: Local ecosystemic perception for integral management of water tanks in Tamilnadu.' In: O. Aubriot (ed.). *Tanks and Well Irrigation crisis: Spatial, environmental and Social issues: Cases in Puducherry and Villupuram Districts (South India).* New Delhi: Concept.

Aubriot, O. and Prabhakar, P. I. (2011). 'Water Institutions and the 'Revival' of tanks in South India: What is at stake locally.' *Water Alternatives* 4 (3): 325-346.

Bharadwaj, A., Pradeep, C., Thirumalaivasan, D., Shankar, C. and Madhavan, N. (2014). 'Morphometric analysis of Adyar watershed.' *IOSR Jornal of Mechanical and Civil Engineering*: 71-74.

Chennai Metropolitan Development Authority. (2015). 'Chapter 1- Introduction.' *Second Master Plan for Chennai 2026.* Chennai: CMDA.

Department of Economics and Statistics, Tamil Nadu. (2017). *Statistical Handbook of Tamil Nadu.* Available at: http://www.tn.gov.in/deptst/climateandrainfall.pdf.

Janakarajan, S., Butterworth, J., Moriarty, P., and Batchelor, C. (2007). 'Strengthened city, marginalised peri-urban villages: stakeholder dialogues for inclusive urbanisation in Chennai, India.' In: J. Butterworth, R. Ducrot, N. Faysse, and S. Janakarajan (eds.). *Peri-urban waterconflicts-supporting dialogue and negotiations - Technical Paper Series 50*, 51-75. Rotterdam: International Water Sanitation Centre, DELFT.

Lindberg, S., Rajagopal, A., Djurfeldt, G., Athreya, V. B. and Vidyasagar, R. (2011). 'Designing collective action: problems of local water managment in Tiruchi district.' *Review of Agarian Studies* 1 (2): 157-178.

Mosse, D. (2003). 'The social ecology and ideology of water.' In: M. David (ed.). *The Rule of Water*, 1-27. New Delhi: Oxford University Press.

Pandey, D. N. (2000). 'Sacred Water and Sanctified vegetation: Tanks and Trees in India.' Paper presented at the conference of the International Association for the study of common property, Bloomington, Indiana, USA, 31 May-4 June.

Ratnavel, S. and Gomathinayagam, P. (2006). *In Search of Ancient Wisdom - Irrigation Tanks*. Madurai: DHAN Foundation.

Seenivasan, R. (2002). Village tanks of India. In: *Village Tanks of South Asia*, 1-19. Madurai: DHAN Foundation.

T. M. Mukundan (2005). *The Ery Systems of South India*. Chennai: Akash Ganga Trust.

Vaidyanathan, A. (2001). 'Introduction.' In: Vaidyanathan. A. (ed.). *Tanks of South India*, 1-4. New Delhi: Centre for Science and Environment.

Vaidyanathan, A. and Subramanian, K. (2001). 'Tank Irrigation in South India: An Overview.' In: Vaidyanathan. A. (ed.). *Tanks of South India*, 5-30. New Delhi: Centre for Science and Environment.

Vanaja. S, J. (2013). 'Rainfall runoff modelling using doppler weather radar data.' Ph.D thesis report, Anna University, Civil Engineering. Available at: http://shodhganga.inflibnet.ac.in/handle/10603/26405.

Wade, R. (1994). *Village Republics - Economic Conditions for Collective Action in South India*. San Fransico, CA.: ICS Press.

Weiz,B. (2005). Water reservoirs in south India- an anthropological approach. PhD thesis, Ludwig Maximilians Universitat, Munich.

Yanagisawa, H. (2008). 'The decline of village common lands and changes in village society: South India, c.1850-2000.' *Conservation and Society* 6 (4): 293-307.

Yanagisawa, H. (2011). 'Village common land, manure, fodder, and intensive agricultural practices in Tamilnadu from mid-nineteenth century.' *Review of Agarian Studies* 1 (1): 23-42.

THE DESIGN AND DECLINE OF TANKS IN SOUTH INDIA

Avantika Bhaskar works as a Project Manager (Research & Development), at Care Earth Trust, Chennai. Her interest lies in water management and she has worked on various aspects of wetland management which focus on challenges of managing wetlands as bird sanctuaries in the state of Tamil Nadu; urban and peri-urban wetland management for water sustainability and flood mitigation; and conservation and management of riparian forests and tropical mountain wetlands for water resilience.

Jayshree Vencatesan works on issues of conservation and sustainable use of biodiversity and ecological restoration, with a special interest in wetlands. She has to her credit 30 scientific publications and one book. She currently serves as the Managing Trustee, of Chennai based NGO, Care Earth Trust.

The monsoon in India is not just a thermally forced phenomena that brings rain (Sikka, 1980), but is also critical to the country's economy and deeply woven into Indian culture. The period from June to September is referred to as the south-west monsoon period (SWM), which is the principal rainfall season for Indian subcontinent. While the whole country receives nearly seventy five percent of its annual rainfall during this period, Tamil Nadu, a state in south India, located largely in the rain-shadow region receives only thirty five percent of its normal annual rainfall of 950 mm during this period. Instead it receives most of its rainfall (approximately forty eight percent) during the north-east monsoon (NEM) from October to December. Unlike SWM, the rainfall during NEM is highly variable; while the coastal areas of the state get nearly sixty percent of the annual rainfall over this period, the interior districts get from forty to fifty percent (Indira and Inbanathan, 2013; Regional Meteorological Centre, Chennai).

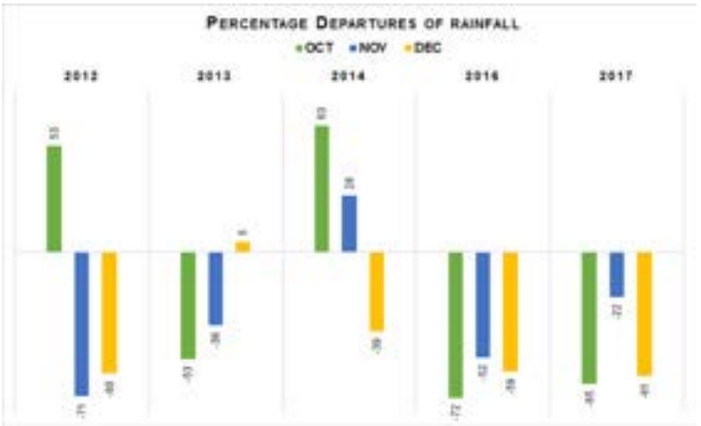


Fig.01 Percentage departure of rainfall from the long period averages of rainfall for Ramanathapuram District during North-east monsoon from October to December. Source: India Meteorological Department (no date).

P222 Simulation of water droplets. Laura Nica, 2017. Software: RealFlow, Grasshopper, 3d printing.

The present study focuses on Ramanathapuram, a district located on the south-east coast of Tamil Nadu. Ramanathapuram receives an average annual rainfall of 820 mm, lower than the state average (Palanisami and Easter, 1983). In addition to being sheltered from the SWM by the Western Ghats mountain range like the rest of the state, it is buffered from the impact of the cyclonic NEM owing to its proximity to the neighbouring island of Sri Lanka, and the convexity of its coastline (Spate and Learmonth, 1967). Rainfall analysis of the NEM over the last five years, shows that the percentage of departure from the normal average rainfall ranged from approximately seventy-two percent below average to sixty-three percent above average in this district, exhibiting high temporal variability (Fig.01). The few rivers in the district are seasonal, carrying substantial flows only during monsoon periods. Further, the hard clayey nature of its soil morphology restricts the availability of the deep freshwater aquifer (Karuppusamy and Gurunathan, 2000) and seawater intrusion poses a significant threat to its rapidly depleting groundwater resources (Santha Sophiya and Syed, 2013).

Despite water stress, Tamil Nadu has a long history of settled agriculture, enabled through a vast network of rivers, reservoirs, tanks, wells and canals. The state has nearly 40,000 tanks, of which 10,000 are located in Ramanathapuram district (Palanisami and Easter, 1983). Historically, tanks were built by kings, rich landlords, local communities, and temples (Agarwal and Narain, 1997). Various dynasties and rulers including Pandyas, Madura Nayaks and Setupathis who ruled this part of the country contributed to tank construction and excavation of channels from 400 BC to the 18th century (Ludden, 1979).

Tanks are basically low storage reservoirs formed by earthen embankments across a drainage slope to capture runoff (Kajisa, Palanisami and Sakurai, 2007). They are locally known by different names such as *yeris* in the northern part of Tamil Nadu, *kanmois* in south, and *kulam*s, tanks associated with temples (Ratnavel and Gomathinayagam, 2006). These century old tanks account for nearly 30% of total irrigated area in South India. Many tanks in the region are part of linked series, in which surplus water from tanks above is discharged into tanks below (Palanisami and Easter, 1983).

In addition to irrigation, the tanks served various purposes such as domestic and livestock use, fishing, groundwater recharge and flood control. Historically, local village organisations maintained the tanks and regulated their water supply. In some cases, villagers would sell portion of their produce or levy taxes to raise funds for tank maintenance. A practice called kudimaramathu or cooperative repair work for maintenance, was prevalent in the region. Activities like dredging and cleaning of the tank was viewed as one of the admirable deeds one could perform in one's lifetime (Agarwal and Narain, 1997; Mosse, 1999; Palanisami, 2006). The tanks also formed an important part of social and cultural lives of villagers with various traditional customs and rituals associated with them (Nelson, 1868).

The study of tank distribution in south eastern part of the state shows a unique pattern. This is described by Spate and Learmonth (1967) as a surface of vast overlapping fish-scales. These authors write about this landscape: 'With a rainfall of only 34 in. (864 mm.) and poor lateritic or gneissic soils, this would indeed be a poor country were it not for its intensive refashioning by the hand of man; and this refashioning has been so intense that no streamlet, however miserable, escapes unchecked to the sea without yielding up its toll of water' (Spate and Learmonth, (1967: 778).

Studies of the geomorphology of the Ramanathapuram landscape reveal the occurrence of a lobate delta dating back to the pre-Middle Pleistocene. Sediment dispersion through several distributary channels during delta formation resulted in an overall lobate shape of the river-dominated delta. Ramasamy (1991) has explained the development of a lobate delta as a process of the constant upliftment of land and the reduced withdrawal of the sea, resulting in the growth of the delta lobe by lobe. It is this lobate delta formation that defined the tank architecture. Its crescent shaped concentric inter-lobal depressions became favourable

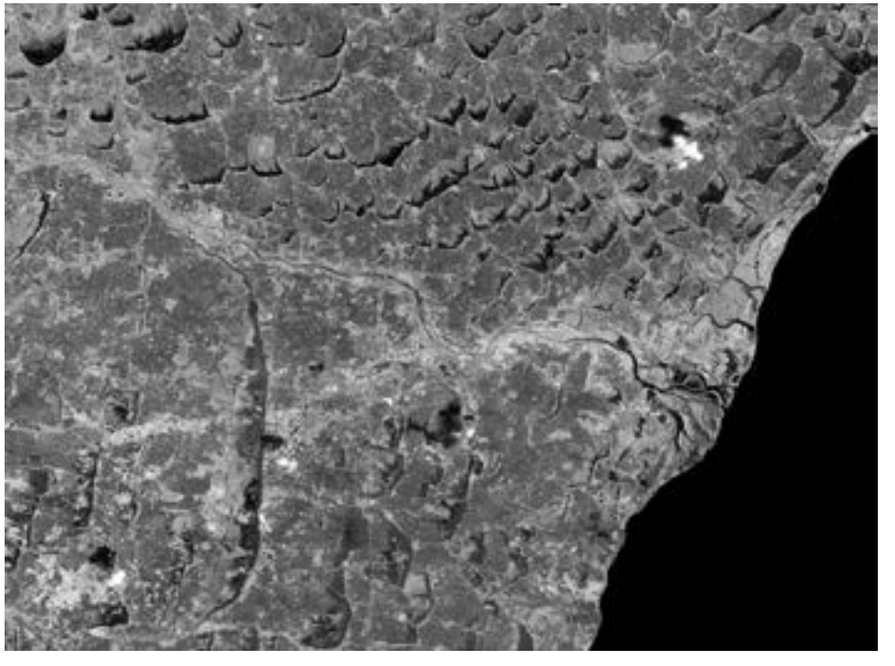


Fig.02 Part of Ramanathapuram and surrounding landscape showing distribution pattern of tanks. Source: Resourcesat-1 LISS-III Data 29 Oct08, National Remote Sensing Centre, ISRO, Government of India, Hyderabad, India.

locations for the accumulation of water. Tanks were constructed across these natural depressions to store water from rivers and/or rainwater behind their earthen embankments or bunds (Ramasamy, 2006; Bitterman et al., 2016) (Fig.02).

A number of such tanks function as man-made wetland ecosystems in the otherwise dry regions, harbouring high biodiversity including water birds. Some of the tanks also support heronries, which are nesting colonies of water birds. While certain heronries have been known to exist for over a century; in other cases foreshore and tank bed plantations by the state Forest Department have been crucial in their creation. Three of such tanks in Ramanathapuram district were declared as legally protected areas (bird sanctuaries) during the past 20-30 years, with a working arrangement between various government departments. These bird sanctuaries are situated on tanks located at the tail end of the Gundar River basin which experiences high variation in rainfall. Water from Gundar River was diverted through the Raghunatha Cauvery Channel built by Raghunatha Sethupathi (ruler of Ramanathapuram) in the 16th C, which feeds a large number of hydrologically connected tanks (DHAN Foundation, 2002).

In a study of the bird sanctuaries conducted between 2013 and 2015, [01] a multidisciplinary approach involving scientific inquiry and public participation was used to examine the interplay between human well-being and ecosystem services (benefits provided by wetland ecosystem) provided by these tanks and bird sanctuaries in Ramanathapuram. The study revealed a historical symbiotic association between the tanks, birds and local communities wherein water of the tanks enriched with bird droppings served as fertiliser for cultivation, and the birds used agricultural fields for foraging and tanks for both nesting and foraging. The seasonal dry-wet dynamics of the tanks was well synchronised with breeding of resident and local migratory birds as well as long distance migrants. The arrival of migratory birds was considered as a key indicator of local climate by the villagers. The appearance of birds was equated with good harvest and fortune, and in many instances, this assumed a symbol of divinity. Villagers collected money for carrying out tank maintenance such as de-silting of tank beds, feeder channels and repair of sluice structures. Further, revenue for tank maintenance was generated by the felling of tree plantations raised by the State Forest Department.

As a consequence of the declaration of these tanks as bird sanctuaries in Tamil Nadu, the management practices began to focus on habitat enrichment for increasing the density of breeding birds to attract tourists. This caused an increase in crop damage by the increased number of birds during the early stages of paddy cultivation, as well as fouling of water. Since these tanks/bird sanctuaries are under the management of the Forest Department, tank re-habilitation works have not been properly carried out, as tanks which continue to be of significance for irrigation are accorded greater priority for maintenance by the Public Works Department. Further, activities such as desilting, grazing, lopping of tree plantations and fishing which were previously managed through customary rules and self-regulation are no longer permitted. This has led to the alienation of local communities and the subsequent degradation of tanks. All the above factors have resulted in loss of storage capacity of the tanks, decline in water quality, increase in evapo-transpiration by the standing plantations, rise of both invasive fish and plant species in the tanks, and decline in groundwater level, etc. (Fig.03) shows a dried up bird sanctuary in Ramanathapuram.

Another conundrum in the region has been the spread of *Prosopis Juliflora*, a species introduced in the 1950's as fuelwood in the dry districts of Tamil Nadu, including Ramanathapuram. As agriculture declined over the years, people started depending on charcoal production using *Prosopis* for sustenance. Agricultural lands are left fallow to facilitate the growth of *Prosopis* and small scale charcoal production helps supplement incomes in the dry season (Fig.04). However, prolonged dry periods owing to monsoon failure and reduced water supply due to lack of tank maintenance have resulted in the invasion of tank beds by *Prosopis*, which thrives in unfavourable environmental conditions. The rapid spread of *Prosopis* in and around the tanks has impacted the flow and storage of water in the tanks, the nesting habitats of birds and local biodiversity. More specifically in the case of protected tanks, lack of funds for tank maintenance, timber sale laws and rapid invasion of Prosopis from the surrounding landscape has made tank management even more challenging. Consequently, these tanks are also losing significance as bird sanctuaries.

Fig.03 A dried up bird sanctuary in Ramanathapuram. Care Earth Trust.

Conclusion

Changing scenarios in the landscape, the involvement of multiple government departments in the protection and management of the tanks as protected areas, alienation of local communities and the problem of *Prosopis*, have all contributed to the decline of these Ramanathapuram tanks. The present study suggests that it is critical to revive the past water flows and integrate the historical human-wetland interface into the management plan of these protected tanks, without which the existing water stress in the region will be aggravated.

Fig.04 Charcoal production using *Prosopis* in Ramanathapuram. Care Earth Trust.

NOTES

01 This study was undertaken by Care Earth, commissioned under the Tamil Nadu Biodiversity Conservation and Greening Project by the Tamil Nadu Forest Department to evolve Wetland Action Plans for eleven bird sanctuaries in the state.

REFERENCES

Agarwal, A. and Narain, S. (eds.). (1997). *Dying Wisdom: Rise, fall and potential of India's traditional water harvesting systems*. New Delhi: Centre for Science and Environment.

Bitterman, P., Tate, E., Van Meter, K. J. and Basu, N. B. (2016). 'Water security and rainwater harvesting: A conceptual framework and candidate indicators.' *Applied Geography* 76 (2016): 75-84.

DHAN Foundation. (2002). *Action Research on Co-management of Tanks for Renovation and Maintenance in Gundar River Basin*. DHAN Foundation.

India Meteorological Department. (no date). 'Customized Rainfall Information System (CRIS), Hydromet Division.' Available at: http://hydro.imd.gov.in/hydrometweb/(S(ucnyabqgglta3w45vadpbae0))/DistrictRaifall.aspx.

Indira, P. and Inbanathan, S. S. R. (2013). 'Studies on the trend and chaotic behavior of Tamil Nadu rainfall.' *Journal of Indian Geophysical Union* 17(4): 335-339.

Kajisa, K., Palanisami, K. and Sakurai, T. (2007). 'Effects on poverty and equity of the decline in collective tank irrigation management in Tamil Nadu, India.' *Agricultural Economics* 36(3): 347-362.

Karuppusamy, N. and Gurunathan, A. (2000). 'Water for All - Making a Reality People's Efforts in Ramanathapuram district of Tamil Nadu,' *DHAN Foundation*. Available at: https://www.dhan.org/vayalagam/pdf/water_for_all.pdf.

Ludden, D. (1979). 'Patronage and irrigation in Tamil Nadu: a long-term view.' I*ndian Economic and Social History Review* 16(3): 347-365.

Mosse, D. (1999). 'Colonial and contemporary ideologies of 'community management': the case of tank irrigation development in South India.' *Modern Asian Studies* 33(2): 303-338.

Nelson, J. H. (1868). *The Madura Country: A Manual*. Madras: Asylum Press.

Palanisami, K. and Easter, K. W. (1983). 'The tanks of South India: A potential for future expansion in irrigation.' *Economic Report ER 83-4*. Minneapolis: University of Minnesota, Institute of Agriculture, Department of Agricultural and Applied Economics.

Palanisami, K. (2006). 'Sustainable management of tank irrigation systems in India.' J*ournal of Developments in Sustainable Agriculture* 1 (1): 34-40.

Ramasamy, S. M. (1991). 'A remote sensing study of river deltas of Tamil Nadu.' *Memoirs of the Geological Society of India, Special Publication on River Deltas of India* 22: 75–89.

Ramasamy, S. M. (2006). 'Remote sensing and active tectonics of South India.' *International Journal of Remote Sensing* 27(20): 4397-4431.

Ratnavel, S. M. and Gomathinayagam, P. (2006). *In Search of Ancient Wisdom - Irrigation Tanks*. Madurai: DHAN Foundation.

Regional Meteorological Centre, Chennai. *Northeast Monsoon*. Available at: http://www.imdchennai.gov.in/northeast_monsoon.htm

Sophiya, M. S., and Syed, T. H. (2013). 'Assessment of vulnerability to seawater intrusion and potential remediation measures for coastal aquifers: a case study from eastern India.' *Environmental Earth Sciences* 70(3): 1197-1209.

Sikka, D. R. (1980). 'Some aspects of the large scale fluctuations of summer monsoon rainfall over India in relation to fluctuations in the planetary and regional scale circulation parameters.' Proceedings of the Indian Academy of Sciences - *Earth and Planetary Sciences* 89(2): 179-195.

Spate, O. H. and Learmonth, A. T. (1967). *India and Pakistan, a general and regional geography*. London: Routledge.

SURFING OUT THE ATMOSPHERE

David Whyte attained his PhD in Anthropology from University College London. His research is based on the relationships cultivated between surfers and waves, and how surfing can be imagined as a collection of practices which allow the human body to communicate with atmospheric forces which would otherwise destroy it.

Fig.01 A surfer waits her turn in the shallows as another surfs past on the artificial wave at Surf Snowdonia, Wales. David Whyte.

Fig.02 The wave-generating mechanism at Surf Snowdonia, Wales, viewed from its western end. The wave is situated in a re-purposed reservoir and is created by a submerged engine which runs across a track in the centre, pushing a wave outwards on either side. David Whyte.

Making waves: The dream of perfect waves that roll to the touch of a button is virtually ubiquitous among surfers globally. As of 2015, this dream became a reality with the unveiling of brand new technology and wave pool design that has made high-quality 'artificial' surf viable for the first time. This has incited a 'space race' in artificial wave design with dozens currently under construction around the world.

My research into this phenomenon investigates how surfers' environmental relationships are altered as they interact with alternative waters animated by alternative means. I argue that surfing can be understood as a collection of techniques and technologies for transforming the body into a channel for oceanic energy: surfers and surfing cultures too become animated by the forces which drive the waves. Herein lies the wave pool designer's difficulty in convincing a large proportion of surfers of the value and authenticity of surfing on artificial waves. It is not so much that these waves are in some way defective - on the contrary, the technology is developing so fast that artificial waves are quickly coming to resemble some of the best waves in the world, but there is more to surfing than wave riding. It is because these particular waters dislocate surfers from oceanic energies that practice and culture require 'artificial' animation, and so are experienced as inauthentic.

OVERFLOW + RISK

EXCEEDING THE IMAGINABLE: CHANGING PERSPECTIVES ON THE MONSOON IN MUMBAI

Theresa Zimmermann is a reseach associate in the Disaster Research Unit at the Freie Universität Berlin, where she works on urban riskscapes. She studied geography and environmental policy and planning in Berlin and Delhi and has coducted research on hydro-social relations. She has frelanced and authored on climate change adaption, water provision and urban mobility.

Introduction

While the monsoon is an important part of people's lives in India, several recent floods in densely populated urban areas showed how heavy rainfalls, during and also outside the regular monsoon periods, can affect and threaten lives and livelihoods of millions of urban dwellers (e.g. Mumbai floods of 2005, Kurnool floods of 2009, Chennai floods of 2015, Kerala floods of 2018). While research demonstrates how disasters encourage political learning and often foster policy change (e.g. Birkland, 2007), research on long-term effects of urban flood disasters is rare. Centered around the devastating floods of 2005 in Mumbai, the aim of this paper is to assess how perceptions of floods and the monsoon have shifted through the perceived exceptionality of the 2005 floods and the technocratic measures taken thereafter. It describes how the floods became interpreted as a disaster, more specifically a disaster that can and should be managed. This perspective is encouraged by the international policy arena and the vocabulary of urban risk, vulnerability, resilience and climate change adaptation. Based on interviews and insights from a field study in a northwestern suburb of Mumbai, some of the changes in flood governance since 2005 are discussed. It is suggested that the focus on technocratic and managerial measures of disaster governance, flood preparedness and risk reduction reflects a meaning-making process that narrows the perspective on the monsoon to a potential hazard or disaster threat, neglecting underlying causes of social vulnerability.[01]

Disaster research

Social science disaster research considers disasters as products of social actions and an ex-post-rationalisation of an extreme form of experience. A disaster becomes a disaster in relation to the non-disastrous everyday or in relation to the societal imaginations of normality (Voss and Dittmer, 2016). Hence, disasters are relational and dynamic social phenomena. Despite it not being sufficient to consider disasters as merely social (Arabindoo, 2016), the consequences and responses to them are socially constructed and they often trigger social and political transformation. Efforts to respond to disasters and to develop post-disaster learning result from processes of interpretation and

meaning-making that 'typically reflect the workings of power' (Tierney, 2015: 13). Socio-political ecology understands disasters as occurring in a political space (Cohen and Werker 2008). Disasters interfere in social, political and planning landscapes. The sociologist Martin Murray (2009: 169) writes that 'seemingly 'extraordinary' events (...) can reveal not only the precarious balance between land-use patterns and the natural environment but also the stark inequalities in the spatial distribution of risk.' Hence, it is crucial to consider how realities around disasters are constructed and to analyze disaster governance, the consideration of risks in urban and environmental policy making and planning, and the conflicts that emerge.

Disastrous floods: The 2005 floods in Mumbai

The 2005 Mumbai floods were framed as a disaster by both authorities and affected people due to the unimaginable amounts of rainfall, the unprecedented and exceptional scale and the devastating impacts the floods had. The floods were indeed exceptional in several aspects. Firstly, the amount of rainfall. While rainfall, soaking and flooding are common in Mumbai, the rainfall records were overtaken on 26 and 27 July 2005, with 944 mm of rain within 24 hours. More than 100 low-lying areas and up to sixty percent of Mumbai's surface area was severely inundated through water-logging or river overflow. Secondly, the human suffering that resulted: hundreds of people lost their lives through drowning, electrocution, landslides or flood-related illnesses and hundreds of thousands suffered from water-borne diseases (Gupta, 2007). Thirdly, the extensive damage to residential and commercial establishments, vehicles, infrastructure, livestock, household items and means to create a livelihood, which impacted mainly the marginalised groups of society (Chatterjee, 2010; Tatano and Samaddar, 2010; Gupta, 2007). Fourthly, the impact on everyday life during the floods and long after: commuters were stuck and communication systems collapsed and many residents remained without potable water or food, services, and appropriate shelter for weeks (Stecko and Barber, 2007; Nandy, 2005). Fifthly, what made the 2005 floods exceptional, especially from the perspective of the interviewed government officials, researchers and planners, was that whereas previous floods had mainly affected low-income settlements, in 2005 all sectors of society were impacted and authorities felt overwhelmed. The geographer Monalisa Chatterjee argues that whereas floods had usually created a certain degree of chaos, losses, and inconvenience, the deaths of 2005 'made this event unusual enough to procure attention from government authorities and the general community' (Chatterjee, 2010: 100). Affecting the financial capital of India with a very high population density, heterogeneous inhabitants and scarce space, the 2005 floods are often said to have revealed Mumbai's vulnerabilities.

The floods as focusing event

Due to their devastating consequences and the perceived exceptionality, the 2005 floods led to a number of policy changes, initiatives and practices. Two examples are used to show how they altered perspectives towards floods, on land and water, on responsibilities in the city – and eventually towards the monsoon itself.

Monsoonal disaster management and preparedness

The first example targets the disaster governance structures in Mumbai, which existed before 2005, but were considerably revised after the floods. Government officials and disaster management practitioners clearly attribute these changes to the experiences of the 2005 floods and the criticism that was raised of the unprepared agencies. The floods are understood as a wake up call, focusing event for policy change and a milestone and learning point for disaster management.[02] However, many of the responses on a governance level have been based on technology, engineering and management. According to Texier-Teixeira and Edelblutte (2017), the largest budget allowed to address flood issues was spent on flood control.

Mumbai was the first Indian city to have an urban disaster management plan. This was prepared in 1999 by the Relief and Rehabilitation Division of the Government of Maharashtra in collaboration with the World Bank, the United Nations Development Programme and several bilateral donor agencies. After 2005, disaster governance plans, standard operating procedures and control centers were considerably revised. The enhanced Greater Mumbai Disaster Management Action Plan (GMDMAP) of 2007 and the 24 ward level disaster management plans that resulted define chronic flooding spots and list standard operating procedures (Government of Maharashtra, 2007). After 2005 the Disaster Management Unit, Mumbai's Command and Control agency, was upgraded into a 'self-sufficient control center built to withstand and outlast disaster' (Municipal Corporation of Greater Mumbai, 2016). The control room is fully equipped and operational around the clock. Dozens of employees monitor footage from thousands of CCTVs and sixty automatic weather stations, disseminate flood warnings, receive emergency calls, and coordinate emergency measures. The room was again upgraded in 2017 and became a well-equipped unit of the municipal corporation. It coordinates between the 24 ward level control rooms and emergency operators like the police or fire brigades.

In addition to improving the handling of floods through disaster management institutions, the 2005 floods are also considered a turning point in preparedness and prevention activities. These comprise technology such as improved rainfall monitoring and warning systems,

geo-information systems for vulnerability assessment and disaster response planning, pre-monsoon management practices such as desilting canals, trimming trees and evicting urban dwellers, the dissemination of flood preparedness guidelines, as well as better coordination amongst institutions, capacity building and training of residents. Furthermore, action was initiated to restore Mumbai's limited drainage system by taking up the Brihanmumbai Stormwater Drainage Project BRIMSTOWAD again. BRIMSTOWAD started in 1993 with a focus on widening and deepening of canals and provisioning pumping stations, but was never fully implemented. As part of the new uptake of the project, the storm water drainage system is currently being augmented, canals and rivers are being desilted, widened, and deepened and storm water pumping stations are being installed (Municipal Corporation of Greater Mumbai, 2015).

Recent policies and plans interpret flooding as one of the largest disaster threats in Mumbai. This is supported by the fact that the institutions responsible for dealing with floods are the institutions that also deal with communal riots, bomb blasts or earthquakes. The unpreparedness experienced in 2005 and the interpretation of floods as disaster led to technological and managerial disaster governance, preparedness initiatives and changes in the built environment. These mainly hazard-focused approaches (Texier-Teixeira and Edelblutte, 2017) are showcased locally, nationally and internationally. However, other interpretations of flooding and the complexities surrounding people's vulnerabilities are less prevalent.

Revaluation of rivers and mangroves

The second example draws attention to how the 2005 floods are understood as an eye-opener and triggering point for the protection of urban environments and mitigation of floods.[03] The city's water bodies have received increased attention after the 2005 floods. The non-governmental Observer Research Foundation even wrote that 'overnight, Mumbai, India and the world came to know the Mithi as the River of Death, which sunk a city of 13 million people' (Kirtane, 2011: 14). As a response to the floods and to exercise flood control of seasonal amounts of water, visible structural work is being undertaken along streams and canals. In addition to the widening of rivers, concrete retaining walls are being constructed to prevent overflow. To do so, thousands of households are being evicted and partly relocated.

Mumbai's mangroves have been a target of new protection schemes, since the destruction of mangroves through land grabbing is considered to be one of the main causes for the intensity of the 2005 floods, especially in the western suburbs (Parthasarathy, 2011). Even though mangrove protection rules were in place long before 2005, mangroves are now increasingly being recognized as natural defense barriers against floods and coastal erosion (Institute of Development Studies, 2018). The destruction of mangroves has been listed as an offence under the Environmental Protection Act, municipal mangrove land was handed over to the Maharashtra Forest Department in 2008 and India's first Mangrove Cell was created in 2012 to focus on mangrove conservation. The cell proposed to install CCTV cameras for monitoring and to construct a wall along mangrove land in several parts of Greater Mumbai (Chacko, 2018). In the first half of 2018, the state mangrove cell announced to have demolished 1767 structures that had been built on mangrove land (Chatterjee, 2018).

Large development projects like the Bandra Kurla Complex or Mumbai's airport that were built on marshy land along the Mithi, were mentioned in a report by the Concerned Citizens' Commission, a network of environmental activists and journalists, as problematic because they narrowed the width of the river and altered its course (Concerned Citizens Commission, 2005). However, these development projects are not part of the city's relocation strategy. Following Murray (2009, quoted above) on inequalities in the spatial distribution of risk, this raises questions on the inequality in the social and spatial distribution of risk reduction initiatives. Further research is needed on how power relations are reflected not only in the meaning-making of disasters and identification of risks, but also in the decisions on what kinds of risk reduction measures are taken. Furthermore, it is necessary to contextualize disasters and risk governance within larger processes of urban development.

Complementing governance and lifeworld perspectives

In the following section, these management, prevention and protection measures are complemented with experiences of affected residents gained from field study. In the Dahisar River flooding, about 100 people were killed (Business Line, 2005), approximately one fourth of the deaths in Mumbai caused directly through flood waters and around 10,000 houses and shops along the river were badly affected. Thousands of families were living below the poverty line and became shelterless overnight (Fact Finding Committee on Mumbai Floods, 2006). Two examples show the controversial and limiting nature of technocratic responses to monsoonal rainfalls.

Disruption of the everyday – living with fear

The disruptions of the everyday, the presence of fear and formation of collaborative forms of support are barely represented by the city's management responses. While the authorities appreciated the calm response of Mumbaikars during the floods and framed the mutual assistance as Mumbai Spirit and resilience, residents of the field

study neighborhoods described the floods as 'the biggest disaster we experienced and a slap on our face.'[04] The memory of the 2005 floods and the threat of future flooding are still omnipresent, and the floods are often used as a reference point, as the moment when personal suffering was huge, when life was threatened, when financial debt started and from whence mutual assistance was necessary to survive. Until today, reports about fear during monsoon season are prevalent.

As official disaster management structures are barely known about, many residents felt and still feel a high level of self-reliance and dependence on their local social networks in emergencies and collaborative practices. When it rains heavily, they store goods on higher levels and check the height of the river rather than using the monsoon app provided by the Municipal Corporation. Members of the two neighborhoods came to rescue each other and provided help throughout the days of flooding and the following months. Until today, the two neighborhoods interact, for example in reciprocal support during religious festivities.[05] In other parts of Mumbai, the number of women self-help groups increased greatly after 2005, as women experienced the positive effect of collaboration and mutual support. Many Mumbaikars developed their ways of coping with the floods in its annual and more extreme forms, but these are often detached from the institutionalised forms of disaster management.

Evictions for flood control measures

The large number of evictions for flood control measures and mangrove protection exhibit similar patterns in its implementation as evictions for large development and infrastructure projects. Environmental and social contradictions surrounding eviction processes can 'fuel conflicts shaping the rocky trajectory of Mumbai's redevelopment,' as Sapana Doshi puts it (2013: 238). Redevelopment and resettlement activities in Mumbai are always conflict ridden and resettlement sites themselves are sometimes based in risk-prone areas or inhabited by people who are then displaced (e.g. Doshi, 2013; Texier-Teixeira and Edelblutte, 2017). Instead of relieving people from the fear of floods through empowerment, potentially new fears are added: the fear of loss of livelihood or losing identity through replacement. Along the Dahisar River, river widening and retaining wall construction led to the demolition of several houses, while other households have received eviction notices. Some of the families have agreed to the rehabilitation for the larger interest of the people residing in the locality (Bhimrao Madhede, cited in Ashar, 2009), but ask for good alternatives instead. As many residents depend on their social networks, they fear social exclusion in other neighborhoods, the loss of income sources and longer travel times to schools, hospitals and their social networks.[06] Tensions among residents over compensation started after demolition of houses began some years ago. Public debate on what

kind of risks individuals and society should bear, which risks should be avoided through what kind of measures and which consequences should be accepted is largely missing.

Conclusion

While a certain orientation towards the monsoon and the prevention of destructing impacts have been part of Mumbai's history, the experience of being unprepared for the unimaginable and living through a disaster enabled new forms of practice and meaning-making. While the floods were considered exceptional and disastrous from both governance and common people's perspectives and preparedness measures were taken at various levels, more holistic meaning-making processes concerning the monsoon and floods are needed. Experiences linked to the floods differ greatly and are closely linked to the local conditions and characteristics of both society and the floods. Life-world interpretations of rain and floods, knowledge of their local characteristics and collaborative practices to cope with them could be used to search for more holistic responses to monsoons in urban areas, in both everyday and extreme forms.

Not only the difference in social and spatial distribution of impacts of the floods, but also the revaluation of environmental resources and the identification of suitable risk reduction, flood prevention and disaster management measures reflect power relations and inequalities. Certain measures such as the construction of walls along rivers or the destruction of mangroves are criticised by NGOs, but a deeper public debate on how risks and vulnerabilities are embedded within urbanisation processes is necessary. This supports recent calls for linking disaster, risk and adaptation studies with urban studies (eg. Fraser et al., 2017; Meerow and Mitchell, 2017).

Finally, as proposed in Anuradha Mathur and Dilip Da Cunha's (2009) *Soak: Mumbai in an Estuary*, it can be fruitful to replace the lens of floods, exceptionality, and disaster with one that sees Mumbai as an estuary, in which flow and flux is embedded in the ordinary and everyday. In Mumbai, structures to cope with floods have been established, but coping with the seasonal monsoon is not thoroughly reflected in urban and environmental planning. It is necessary to investigate different understandings of the monsoon and the way these understandings are altered when it is viewed as a hazard or potential disaster threat. Further research should focus on how rainfall has historically interacted and currently interacts with cities and societies, how local topography and the built environment influence flows and how societies understand rains and its extremes.

NOTES

01 The research builds on literature review, interviews and field visits, including group discussions in 2015 and 2016, 10 years after the floods occurred. Fieldwork was conducted in two neighborhoods in the northwest of Mumbai along the Dahisar River, a part of the city which is not as researched as more central parts of the city, but was heavily affected by the floods.

02 Interviews with government officials, researchers and NGO representatives in Mumbai in December 2015 and January 2016.

03 Interview with government official in December 2015.

04 Interviews with residents of two neighborhoods in northwest Mumbai in December 2015 and January 2016.

05 Interview with community member in January 2016.

06 Interview with community member in January 2016.

REFERENCES

Arabindoo, P. (2016). 'Unprecedented natures?' *City* 20 (6): 800-82.

Ashar, S. (2009). 'Leper Colony to be shifted for Dahisar river-widening project. *dna*, 01 April. Available at: http://www.dnaindia.com/mumbai/report-leper-colony-to-be-shifted-for-dahisar-river-widening-project-1218562.

Birkland, T. A. (2007). *Lessons of Disaster. Policy Change after Catastrophic Events*. Washington D.C.: Georgetown University Press.

Business Line. (2005). 'Maharashtra to constitute disaster management body.' *The Hindu*, 08 October. Available at: http://www.thehindubusinessline.com/todays-paper/tp-economy/article2185965.ece.

Chacko, B. (2018). 'Maharashtra: Mangrove patches to be cleared of all encroachments by March.' *Indian Express*, 25 January 2018. Available at https://indianexpress.com/article/cities/mumbai/maharashtra-mangrove-patches-to-be-cleared-of-encroachments-mumbai-5038212/.

Chatterjee, M. (2010). *Resilient Flood Loss Response Systems for Vulnerable Populations in Mumbai: A Neglected Alternative*. Dissertation. Rutgers University.

Chatterjee, B. (2018). '1,767 encroachments at 7 mangrove spots in Mumbai demolished.' *Hindustan Times*, 02 June 2018. Available at: https://www.hindustantimes.com/mumbai-news/1-767-encroachments-at-7-mangrove-spots-in-mumbai-demolished/story-U2WiDMFy11rwYsJILJEwIK.html.

Concerned Citizens' Commission. (2005). *Mumbai Marooned: An Enquiry into Mumbai Floods 2005*. Mumbai: Conservation Action Trust.

Doshi, S. (2013). 'Resettlement Ecologies: Environmental Subjectivity and Graduated Citizenship in Mumbai.' In: Rademacher, A. and Sivaramakrishnan, K. (eds.). *Ecologies of Urbanism in India. Metropolitan Civility and Sustainability*, 225-249. Hong Kong: Hong Kong University Press.

Fact Finding Committee on Mumbai Floods. (2006): *Final Report. Volume 1.*

Fraser, A., Leck, H., Parnell, S., Pelling, M., Brown, D. and Lwasa, S. (2017). 'Meeting the challenge of risk-sensitive and resilient urban development in sub-Saharan Africa: Directions for future research and practice.' *International Journal of Disaster Risk Reduction* 26(S): 106–109.

Government of Maharashtra. (2007). *Greater Mumbai Disaster Management Action Plan. Risk Assessment and Response Plan. Vol 1.*

Gupta, K. (2007). 'Urban flood resilience planning and management and lessons for the future. A case study of Mumbai, India.' *Urban Water Journal* 4(3): 183–194.

Institute of Development Studies. (2018). 'Transforming Urban Governance to Manage Uncertainty and Climate Change in Mumbai, India'. *IDS Policy Briefing* 148.

Kirtane, G. (2011). 'Making the Sewer a River again. Why Mumbai must Reclaim its Mithi.' *Observer Research Foundation*. Available at: http://www.indiawaterportal.org/articles/why-mumbai-must-reclaim-its-mithi-study-observer-research-foundation

Mathur, A. and da Cunha, D. (2009). *Soak. Mumbai in an Estuary*. New Delhi: Rupa & Co.

Municipal Corporation of Greater Mumbai. (2015). *Flood Preparedness Guidelines*.

Municipal Corporation of Greater Mumbai (2016). *Greater Mumbai Disaster Management Authority*. http://dm.mcgm.gov.in:9080/gmdma/?page_id=19.

Meerow, S. and Mitchell, C. L. (2017). 'Weathering the storm: The politics of urban climate change adaptation planning.' *Environment and Planning* 49 (11): 2619–2627.

Nandy, S. (2005). 'Floods in India - Disaster and Management.' *International Flood Network*. Available at: http://www.internationalfloodnetwork.org/AR2006/AR08Nandy.pdf

Parthasarathy, D. (2011). 'Hunters, Gatherers and Foragers in a Metropolis: Commonising the Private and Public in Mumbai.' *Economic & Political Weekly* XLVI (50): 54–63.

Stecko, S. and Barber, N. (2007). 'Exposing Vulnerabilities: Monsoon Floods in Mumbai, India.' Case study prepared for *Revisiting Urban Planning: Global Report on Human Settlements*. United Nations Human Settlements Programme. Available at: http://www.unhabitat.org/grhs/2007.

Tatano, H. and Samaddar, S. (2010). 'Flood Risks Reduction in Livelihood Risks: Thoughts and Insights from Mumbai.' *Annuals of Disaster Prevention Research Institute, Kyoto University* 53(B): 105-114.

Texier-Teixeira P. and Edelblutte E. (2017). 'Jakarta: Mumbai—Two Megacities Facing Floods Engaged in a Marginalization Process of Slum Areas.' In: Sudmeier-Rieux K., Fernández M., Penna I., Jaboyedoff M. and Gaillard J. (eds). *Identifying Emerging Issues in Disaster Risk Reduction, Migration, Climate Change and Sustainable Development*, 81-99. Cham: Springer.

Tierney, K. (2015). 'Foreword.' In: Egner, H., Schorch, M. and Voss, M. (eds.). L*earning and Calamities: Practices, Interpretations, Patterns*, xiii-xviii. New York: Routledge.

Voss, M. and Dittmer, C. (2016). ‚Resilienz aus katastrophensoziologischer Perspektive.' In: Wink, R. (ed.). *Multidisziplinäre Perspektiven der Resilienzforschung*, 179-197. Wiesbaden: Springer.

INTEGRATING FLOOD RISK IN URBAN AND ARCHITECTURAL PROJECTS

Laura Verdelli is an Architect (Politecnico di Milano, Italy), a Landscape Architect (Fondazione Minoprio, Como, Italy) and a Spatial Planner (PhD in Urban and Regional Planning in Tours, France – and in Cultural Heritage and Museology in Coimbra, Portugal). She is currently an Associate Professor in the Spatial Planning and Environment Department of the University of Tours and a researcher at the laboratory CITERES. She focuses her research on the processes of identification, protection and enhancement of heritage cultural landscapes along water in the Mediterranean and in India.

Introduction

This paper focuses on how flooding hazards are considered in urban projects at a neighbourhood scale, with particular regard to local political strategies. The main idea is not to focus on flood risk prevention and management itself but to point out urban practice, professions, tools and interests of spatial planning. The paper aims at investigating the possible adaption of the French case (where urban projects can still be developed in flood areas respecting specific sets of rules) to the Chennai metropolitan area in India, where environmental rules and flood risk prevention and management are not very effective. It asks whether a difference could be made by spatial design practitioners through their everyday professional expertise. The idea is thus to structure and exploit the results of a study about recent urban projects in flood prone areas in France to analyse the context of Chennai. In France it is very easy to distinguish between floodable and non-floodable areas but this evidence is much more nuanced in India. We were interested in whether the analysis of recent urban design and urban architectural projects in various regions of France and how flood risk, policies and rules was integrated into them, could lead to conclusions about preventing minor flooding in Chennai.

This brought together the methods and results of two research projects, PRECIEU[01] and ARCUS[02] in the following way: a selection of recent urban design and urban architectural projects in various regions of France was analysed in terms of their legal context and rules, public policies and their impacts and planners' and architects' contributions to the establishment of a flood-proof neighbourhood model; vulnerability criteria were identified and developed into a vulnerability index; a typology of neighbourhoods in Chennai was elaborated; case study districts in the Chennai Metropolitan Area (CMA) were analysed in terms of the vulnerability criteria.

Results of the analysis of French study cases: building on floodable areas does not bring architectural innovation and encourages gentrification.

To structure our observations on Chennai, we started by reconsidering some of the results of PRECIEU, the research project implemented in France (2014-2017). This project traced the genesis of urban projects and analysed the extent to which flooding was a consideration in their conception. Three urban projects in three different middle-size French cities were studied: Saint-Serge/Thiers-Boisnet in Angers; Docks Vauban/Saint-Nicolas in Le Havre; and Les Berges de la Robine in Narbonne. These shared a multi-risk spatial system, a large part of their urban space was subject to flooding hazards and they all had active local risk management policies.

The results showed that it is easy to follow regulations in France and that, from a technical point of view, building in flood prone areas is still an option and that, more than the flood risk in itself, it is the constraint associated with the national flood prevention plan that is perceived as a barrier by urban design professions. Architectural and urban implications of flood prevention rules are not evident to population, even if a flood risk can be exploited to justify architectural choices (for example, upper-elevation), urban solutions (arrangements of public spaces) or social consequences (gentrification). At the local development scale, the research found that the advantages of urban development in flood prone areas were considered to be higher than the constraints induced by the flooding hazard. Urban renewal strategies of dilapidated urban areas located closed to city centre, even if subjected to flood risks, look very attractive to municipalities, especially to develop a residential economy. Because urban projects generate so many uncertainties and constraints, flood-risk based regulation is only one parameter among others such as soil pollution, enhancement of heritage etc. The notion of resilience is only evoked when a regulation requires a risk consideration in all project steps. The presence of visible water is presented as an asset for urban projects and relations with water are over-mobilised in descriptions and conception choices as arguments of territorial marketing, in order to re-qualify the image of a neighbourhood. Finally, it was found that landscape architects play a significant role in urban projects in flood-prone areas, translating 'risk-water' into 'pleasure-water.'[03]

PRECIEU started with the hypothesis that the presence of constraints leads to architectural (and eventually social) innovation. Very quickly it became apparent that this was a false assumption. Designers of architectural and urban projects in flood prone areas in middle size towns in France apply the minimum effort to address legal constraints and flood risk serves as an argument to help developers and local authorities to prevent demonstrations against gentrification processes. The analysis of the projects showed that they adopted a copy/paste approach, transposing the same set of conventional spatial solutions into their projects: raised ground floors, semi-underground parking places, ground floor shops, large green spaces, topographic drops, semi elevated walkways etc. These spatial solutions contribute to, both reducing flood risk and 'gating' communities. The semi-underground parking spaces, for example, help in flooding but end up with unfriendly architecture from the road side and with water-proof walls looking out at the road. Private entrances on public roads (raised and bounded with fences) differentiate private and public walkways. Ground floor retail (which are mostly not sold out) help in building high-end housing and in keeping non-residents away while heritage waterfront redevelopments exploit 'identity' as an argument, and design an appealing picture to attract customers. The selected examples show that in some newly built areas, to buy or rent a house is 30% more expensive than the town average. This clearly has a gentrifying effect, where ideas of good quality of life, buildings overlooking water bodies and the presence of green buffer zones reminding of water and floods as components of memory are promoted to build a new image for the recently developed districts. Following flood prevention rules has resulted in upmarket housing (Rousseau, 2014), which consequently leads to non-planned gentrification.

The results of the French case studies were applied to the monsoonal context of Chennai, in order to investigate whether some profitable knowledge transfers were possible. We asked whether it was possible to pursue mitigation of flood risk in Chennai by empowering landscape architects, architects and urban planners and fostering their ethical role. The following section of the paper discusses the outcomes of this investigation.

Chennai: the major study case

Chennai has a low relief and is covered by a great number of water bodies (rivers, water tanks and reservoirs, etc.) and, due to wide social disparities, the urban area shows a wide variety of urban morphologies.[04] For two months of the year (approximately from mid-October to mid-December), Chennai is dominated by monsoon rains. Over a short duration of time a large quantity of rain falls, often resulting in flood disasters of various intensities. Major disasters, like the one occurred in December 2015 as a result of the releasing of water from the Chemabarambakkam Lake (a retention reservoir upstream of the metropolitan area), requires proper disaster management. But 'regular' minor floods, where water is up to 10 cm everywhere, though not considered by people as flooded, could be easily avoided through architectural and urban design solutions. To describe this recurrent situation and to differentiate it from a major flood, we call it 'wetness' (Mathur and Da Cunha, 2009; Da Cunha, 2018). In Chennai, where there is a consciousness that the monsoon brings what is necessary to life, no one feels that for these two months they

are under flood. This way of coping with what could be seen as minor, everyday flooding is accepted in cities like in Chennai, whereas it is evidently unacceptable in Europe, where water is drained away very quickly. Nevertheless, how to deal with this wetness, whether it is well perceived and considered to be acceptable? Our reflection was based on the idea that, while urban projects can do little against major floods, they can make a difference under monsoon wetness.[05]

To study the context of Chennai it was necessary to take into consideration that access to data (both rough and structured) is not easy; that urban patterns vary considerably and are scattered; that there is no clear record of historic flooding on official maps, documents and rules, except on the costal management plan of Chennai, which identifies an annual flood zone along the rivers. To build a representative scheme of the different levels of vulnerability in Chennai we first constructed a typology of built forms, both architectural and urban (Collé, 2016). Then, based on previous work, we selected vulnerability indicators adapted to the specific situation in Chennai (Foreau and Guesdon, 2018). Studies were then conducted to identify suitable neighbourhoods and we finally selected four districts, representing a *minima* urban and social diversity. We intentionally choose districts located along one of the two seasonal rivers in Chennai, the Adyar River, which is now perennial through sewage and which is less dammed than the other one, the Cooum River, as we assumed that flood risks were higher.

In the context of an analytical approach to the treatment of urban vulnerability, the research focused on building scale. The objective was to be able to define the vulnerability of buildings according to previously defined indicators. Starting from available vulnerability assessment grids, a specific grid was elaborated, pointing out the so-called 'construction' and 'preparation' components of vulnerability. The first relates to the intrinsic characteristics of the construction of the building, while the second refers to the adaptation of the building to risks.

The calculation of vulnerability indices is based on indicators that are categorised beforehand according to several ranks. Classification is based on the systematisation of the information collected on site and from documents. Complements to these data are based on feedback from the same or comparable territories. A first comprehension of the territory, its politics, its context, the social and cultural specificities that characterise it is also necessary. By following this approach, it was possible to evaluate the criteria according to the local situation and to organise a classification. For the Chennai case, six criteria which could be easily observed and measured were used:

- Building materials: mostly linked to the inhabitants' social class, they impact a building's flood resistance
- Preservation status of buildings: linked to the age of the building, this refers to the initial building quality and the efforts to preserve the building; this status highlights the potential fragility of the building
- Elevation: based on the natural or artificial topography, this refers to the level difference between a street and a building
- Number of floors: this indicator refers to a potential vertical evacuation and shows the possibility for the population to be sheltered inside a building
- Hazard distance: proximity to a water body
- Measures of hazard adaptability (upstream building): technologies or design implemented before the building to reduce flood risk, such as orientation of the buildings, road width, presence of open spaces etc.

These criteria were used to analyse the four study sites identifed in (Fig.01).

Fig.01 Map of Chennai, locating the four selected districts. Maliet and Chollet, 2017, Lausin, 2018.

West Saidapet, an informal settlement

This district is composed of residential constructions informally built. Its morphology is delimited by the Abdul Razzack 1st Street (North and West), the Maraimalai Adigalar Bridge (East) and the Adyar River (South). Its vulnerability index was estimated on: proximity to the Adyar River; reduced public spaces, as to optimize the area for housing; reduced floor space: between 10m^2 and 15m^2; high density of buildings and population; reduced elevation, single storey houses with a maximal height of 2 metres; building materials, secondary raw material for roofing and walling.

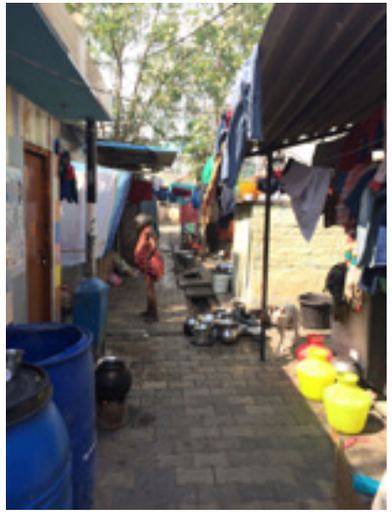


Fig.02, 03 West Saidapet. Foreau and Guesdon, 2018.

Kotturpuram, a state-planned district

This district is a state-planned uniform district composed of residential flats. Its morphology is delimited by: the Adyar River (North and West), the Turnubulls Road (East) and the Chitra Nagar Street (South). This district was built to relocate slum dwellers. Its vulnerability index was estimated on: proximity to the Adyar River; structured organisation of streets and buildings; reduced area for public space, the priority been given to the housing; high density of buildings and population, one standard model of building: 3 floors, 420m^2 and 20 dwellings.

Fig. 04, 05 Kotturpuram. Foreau, 2018.

West Jafferkhanpet, a medium-class unplanned district

This is a middle-class district composed of residential plots mostly with several dwellings in one building. Its morphology is delimited by: the Adyar River (South), the Moonisharwarar Temple (West), the Ekkattuthangal Bridge (East) and the Kanchi Natarajan and Periyar Streets (North). Its vulnerability index was estimated on: proximity to the Adyar River; structured organisation of streets and buildings; presence of free space reserved for vegetation, between 100m^2 and 250m^2, buildings located on large parcels of land; height of the buildings: 2 to 4 floors.

Fig. 06, 07 West Jafferkhanpet. Foreau and Guesdon, 2018.

South Quibble Island, a recent wealthy neighbourhood

This is a recently developed neighbourhood located between the Adyar River and south of the main road composed of high residential towers. What we will call 'South Quibble' is delimited by: DGS Dinakaran road, the Adyar River, Janaki Avenue and Thandavaryan Street and Sathyadev Avenue. Its vulnerability index was estimated on: proximity to the Adyar River; urban form, huge buildings and towers with big public spaces; urban services, large roads with proper sewage; building height, from 6 to more than 20 floors.

Fig.08 South Quibble Island. Verdelli, 2018.
Fig.09 South Quibble Island. Foreau and Guesdon, 2018.

	BUILDING MATERIALS	PRESERVATION STATUS
WEST SAIDAPET	Secondary raw materials dump mostly used	Hardly maintained
WEST JAFFER-KAMPET	Cement or concrete blocks	Maintained
KOTTURPURAM	Cement or concrete blocks	Poorly maintained
SOUTH QUIBBLE ISLAND	Cement or concrete blocks	New buildings Well maintained

ELEVATION	NO. OF FLOORS	HAZARD DISTANCE	ADAPTABILITY MEASURES
No elevation higher than 'street floor'	1	Close proximity (less than 100m to Adyar River)	'Garbage wall' along the river used as protection against floodwater
Elevation raising the building gate from the street	2 to 4	Close proximity (less than 100m to Adyar River)	'Hard wall' along the river used as protection against floodwater; Ground-floor often used for parking
No elevation, ground floor exactly at street level	3	Close proximity (less than 100m to Adyar River)	Earthy wall (4/5m) along the river used as protection against floodwater; Main blocks orientation perpendicular to water flow direction
Building are built on an artificial hill: a few meters above street level	> 20	Close proximity (less than 200m to Adyar River)	Towers have an empty ground-floor for reception and cars; Presence of slopes and water evacuation systems

Fig. 10 Level of adaptation of buildings to flood risks. After Foreau and Guesdon (2018: 21-22).

The results of the research are summarised in (Fig.10) and show that economically weaker inhabitants are more prone to flood risk. In spontaneous districts no architectural adaptation to cope even with wetness has been observed. Moreover, the state-planned district (Kotturpuram) appears nearly as vulnerable as the spontaneous one. No attention is paid by authorities or practitioners (urban designers or architects) to reduce this vulnerability. The research found that only middle-class and higher-class districts exhibit architectural forms adapted to wetness, with main walls parallel to the direction that water flows, few steps to enter buildings, semi-underground parking etc. The analysis of urban evolution of the four districts through documents and maps also showed that some areas (the South Quibble Island for example) had been developed as a result of slum clearances. Slum dwellers were relocated by authorities into new state-planned districts, officially to be protected from flood risks, while, in fact, the relocation sites are not necessarily paying specific attention to this factor, and they are very far from the inner centre of the town. The relocation site of Kannagi Nagar, for example, is located in a previous marshland and it is 20 km far from Saidapet, the original slum (Hochart, 2014). The cleared sites were quickly reconstructed as flood-adapted housing, affordable only to middle to higher classes. This, as has been observed in France, led to gentrification. Where architectural adaptation to flooding was apparent, it was only in new upper middle-class districts, transforming low income, neglected places along the river into valuable lands.

Conclusion

To conclude, in France and more broadly in Europe, flood zones can be easily differentiated. Legal definitions of what a flood is draws very clear constraints and rules. Flood prevention and management can

be easily monitored through modelling and using specific methods of construction. However, the 'copy/paste' effect in architecture makes it very easy to de-humanise urban projects in response to risk. Public authorities and developers can hide themselves behind security arguments as reasons for hidden gentrification.

In Chennai, there is much less operational regulatory framework and flood areas cannot be easily differentiated. The boundary between what is flooded and what is not flooded is not always simple to identify from a legal point of view. This means that vulnerability levels have to be built or estimated case by case, on very specific and small surfaces, at a district level. Thus, a more human approach is needed as these areas cannot be treated as a whole, but only in specific parts. This applies specifically to the ordinary, regular wetness that people live with during the monsoon. In this situation, the responsibility to build low-cost, wetness-friendly districts is given to practitioners, who must foster their ethical role to take up the challenge and believe they can make the difference. However, we observed the same perverse effect in Chennai as in France: that building flood resilient buildings often leads to gentrification, legitimised by words like 'risk' and 'vulnerability.' The answer to risk and vulnerability becomes to build more costly architecture, moving lower social and economic classes away from the inner centre, increasing real estate development and gentrifying the city.

ACKNOWLEDGEMENT

My warmest thanks are due to Ms Varshini Jaichandran and to Ms Abilasha Moorthy, master students of the PS/URP Planning and Sustainability / Urban and Regional Planning, English master of the University of Tours, 2017-2018, who helped with the redaction of the text.

NOTES

01 Projet d'Étude sur la Contrainte d'Inondation dans les projets urbains en Espaces Urbanisés - Integrating Floods in Urban and Architectural Projects, funded by the French Programme Risque Décision Territoire (RDT) 'La Résilience des Territoires face aux Risques'; scientific direction by Gralepois, M. and Rode, S.

02 Planification urbaine durable – Sustainable urban planning, funded by the French Ministry of Foreign Affairs, on the 7th ARCUS call for Scientific projects; scientific direction by Verdelli, L.

03 The content of the paragraph is taken from the PRECIEU final research project report (Bonnefond et al., 2017).

04 See Vedamuthu and Rukkumany and Cullen in this volume.

05 The field work to collect all the data was realised by master students, PhD scholars and lecturers over the past 5 years, overlapping with the ARCUS project (2013-2017).

REFERENCES

Bonnefond, M., Daniel-Lacombe, É., Gralepois, M., Guevara, S., Orillard, F., Rode, S. and Verdelli, L. (2017). *Projet d'Étude sur la Contrainte d'Inondation dans les projets urbains en Espaces Urbanisés - Integrating Floods in Urban and Architectural Projects. Final Research Report.* Unpublished.

Collé, V. (2016). *Relation ville-fleuve : Adaptation au risque d'inondation.* Masters Thesis, University of Tours, Tours.

Da Cunha, D. (2018). *The Invention of Rivers: Alexander's Eye and Ganga's Descent.* Philadelphia, PA.: Penn Press.

Foreau, C. and Guesdon, S. (2018). *Les mégapoles des pays émergents face aux risques.* Masters Thesis, University of Tours, Tours.

Gralepois, M. and Rode, S. (2017). 'L'urbanisme résilients déforment-il la ville ?' *Revue Risques Urbains* 17(1): 1-18. doi: 10.21494/ISTE.OP.2018.0205.

Guevara, S. and Gralepois, M. (2015). 'L'adaptation aux risques d'inondation façonnée par les métiers de la ville.' *Revue Développement durable et territoires* 6(3): 1-18. doi: 10.4000/developpementdurable.11014.

Guevara, S, Rode, S and Gralepois, M. (2017). 'Le changement radical et silencieux de paradigme sur le développement urbain face aux risques naturels.' *Revue Métropoles* 20. Available at: https://journals.openedition.org/metropoles/5486.

Hochart, K (2014). *Perspective on slums and resettlement policies in India - The case of Kannagi Nagar Resettlement Colony, Chennai.* Masters Thesis, University of Tours, Tours.

Maliet, E. and Chollet, L. (2017). *Considering the river space in Chennai. Professional internship report.* École de la Nature et du Paysage, INSA Centre Val de Loire, Blois.

Mathur, A. and Da Cunha, D. (2009). *Soak: Mumbai in an Estuary.* New Delhi: Rupa & Co.

Orillard, F., Gralepois, M. and Verdelli, L. (2018). 'L'instrumentalisation de la prévention des inondations dans les opérations d'aménagement, une justification de la gentrification ? Le cas de la ville-port du Havre (France).' *Revue Carnet de géographes* 11. Available at: http://journals.openedition.org/cdg/1713.

Rode, S. and Gralepois, M. (2017). 'Towards an Urban Design Adapted to Flood Risk?' In: Vinet, F. (ed.). *Floods 2. Risk Management,* 365-378. London: ISTE PRESS & Elsevier.

Rode, S., Guevara, S and Bonnefond, M. (2018). 'Resilience in urban development projects in flood-prone areas: a challenge to urban planning professionals.' *Town Planning Review* 89(2): 167-190.

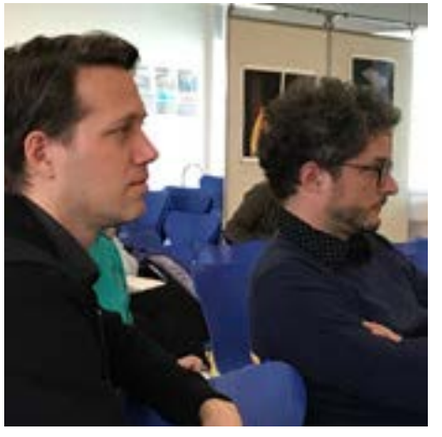
Rousseau M. (2014). 'Urban redevelopment and social (in)justice: Neoliberal strategies for "moving upmarket" in shrinking cities'. *JSSJ - Justice Sociale/Social Justice* 6: 1-16.





Dilip da Cunha, Laura Verdelli, Ed Wall, Tim Waterman; Kristen Blinkenberg Hastrip,
Monsoon [+ other] Waters Symposium
Lindsay Bremne, Dilip da Cunha, R. H. Rukkumanyr; OmarManshi, Pushpa Arabindoo



Megnaa Mehtaa; Harry Charrington, David Chandler
Anthony Powis, Theresa Zimmerman; Anthony Acciavatti, Matthäus Rest
Beth Cullen; Constantina Avraamides, Anett Bako, Sarah Bass

Monsoons [+ other] Waters
A Monsoon Assemblages Publication

Edited by Lindsay Bremner

ISBN 978-0-9929657-0-9

The Monsoon Assemblies publication series are available to download as PDF's from www.monass.org/writing/ or to purchase from online stores.

Monsoon Assemblages
School of Architecture and Cities
University of Westminster
35 Marylebone Road
London
NW1 5LS

European Research Council
Established by the European Commission

European Commission

Horizon 2020
European Union funding
for Research & Innovation

Monsoon Assemblages is a research project funded by the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (Grant Agreement No. 679873).

Monsoon [+ other] Waters is the second of three publications by Monsoon Assemblages, a research project funded by the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (Grant Agreement No. 697873). It arises from a symposium held at the University of Westminster, 12-13 April 2018. It contributes to Monsoon Assemblages' agenda to foster interdisciplinary conversations between the environmental humanities (anthropology, environmental studies, political ecology, cultural geography and philosophy), the natural sciences (meteorology, climatology and climate science) and spatial design (architecture, landscape architecture, planning and urban design) to further understandings of the impacts of changing monsoon climates and rapid urbanisation in South Asian cities and beyond.

European Commission
Horizon 2020
European Union funding
for Research & Innovation

ISBN 978-0-9929657-0-9
90000
9 780992 965709