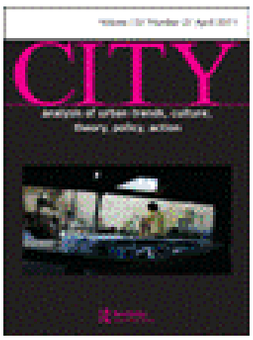

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Unprecedented natures?
An anatomy of the Chennai floods

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Between November and December 2015, the southern Indian city of Chennai (alongside the northern coastal regions in the state of Tamil Nadu) experienced torrential rains with unanticipated flood consequences. Notoriously known as India's 'water scarcity capital', instead of the proverbial 'poor monsoons', a series of low-pressure depressions with 'record-breaking' rainfall submerged the city rapidly, as homes and apartments flooded, communications were cut and transportation came to a standstill, including the closure of the airport. Even as environmental activists took the state and its allied actors (in the development and planning sector) to task over what they considered was a deliberate and reckless 'urbanisation of disaster', the state sought refuge in the argument that this was an unprecedented (global) weather anomaly. Recognising the need for a more robust (post-) disaster discussion, this paper offers an anatomy of the floods that begs a broader rethink of 21st-century urban disasters and argues that the current discourse offered by the social science of disaster is insufficient in unravelling the complex spatial and environmental histories behind disasters. It goes beyond setting up a mere critique of capitalist urbanisation to offer a cogent debunking of the deeply engrained assumptions about the unprecedented nature of disasters. It does so by dismantling three commonly invoked arguments that transgress any kind of environmental common sense: (1) the 100-year flood fallacy; (2) the ensuing debates around environmental knowledge and subjectivities; and (3) the need to spatially rescale (and regionalise) the rationale of the 'urbanisation of disaster'. It concludes by raising concerns over the persistence of a resilience discourse, one that relies on the will of the 'expert' underwriting not only a non-specific techno-scientific approach but also perpetuates a politicisation of risk that shows little promise of accommodating new epistemologies that are socio-ecologically progressive.

Key words: floods, unprecedented, environmental knowledge and subjectivities, urbanisation of disaster, risk and resilience, Chennai

> 'There is no such thing as a natural disaster.' (Neil Smith 2006)
> 'Chennai is a natural disaster of unprecedented scale.'(Prakash Javadekar 2015, Minister of State [Independent Charge] for Environment, Forests and Climate Change, 26 May 2014–5 July 2016)

For a city tagged indubitably as India's 'water scarcity capital' (Potter 2015, 112), Chennai's water woes took a surprising turn towards the end of 2015 when torrential rains pelted the city with unanticipated flood consequences. Only a month earlier, amidst nervous anticipation of the North-east monsoon (or what is

known popularly as the winter monsoon), newspapers were bemoaning a dismal South-west or summer monsoon, by the end of which all sources of water supply had been sucked dry, and politicians and policymakers were running out of their repertoire of tricks to avoid a drought-ridden disaster. While the initial onset of rains brought some comfort to an anxious city, it soon became obvious that this was not going to be yet another year of average or less than normal rainfall. Instead, through a series of low-pressure depressions in the Bay of Bengal triggered by what weather experts referred to as a 'super-charged monsoon', Chennai (and the northern coastal regions in the state of Tamil Nadu) experienced heavy downpours resulting in 'record-breaking' rainfall for the months of November and December. As the city submerged rapidly, homes and apartments were flooded, communications were cut and transportation came to a standstill, including the closure of the airport for several days. With lives lost, extensive property damage and businesses affected, Chennai was declared officially a disaster.

Almost immediately, Katrina-esque images of a 'city under water' circulated widely over the Internet and international media relayed reports on this deadly disaster. Even the UK broadsheet *The Guardian* set aside its frequent preoccupation with Mumbai as India's metonymic megacity to cover this critical situation. As a city that rarely makes it on the international radar of news reporting, after the devastating 2004 tsunami, Chennai found its natural misery being written once again into a global story. Somewhat reassuring during this dark hour was the spate of citizen reporting where residents provided eyewitness accounts of the unfolding events in terms of not only a sense of shock over losses incurred but also with empathy about how they were recouped through the voluntary heroics of local civilians. Since the Mumbai floods of 2005, such framings have become a standard where, as Anjaria (2006) observed, public imagination is captured by incredible acts of selflessness and outpourings of generosity, with people setting aside their socio-economic prejudices to help one another and ensure that the city doesn't descend into outright chaos. Often relayed through popular coverage by traditional and, more recently, social media, they claim not only a realistic representation of the lived experience of disaster but their optimistic ethos is also a much-needed morale booster at a moment of despair.[1] While these stories may not shy away from asking difficult questions such as the need to untangle long-standing socio-political factors that contributed to the disaster, such queries are implicit as their preoccupation is to lessen the sense of threat for those caught in the milieu of the aftermath, unwittingly making the event seem more personal and constrained. It would be too much to expect these free-floating narratives to assemble the parts and pieces of this particular event together into a broader (post-) disaster appraisal. More importantly, in a context where those affected are eager to know 'why this has happened (to us)', individual, first-hand, folkloric accounts provide little challenge to the explanations offered by a state quick to acquit itself.

Thus, while the Chief Minister Jayalalithaa's initial reaction that 'losses are unavoidable when there's very heavy rain' suggests a commonly entrenched fatalism about the monsoons and its regular trail of death and destruction, her subsequent depiction of the event as the 'rarest of the rare' is more in line with the official position projecting the floods as unprecedented. This is not dissimilar to Davis' (1995) dialectic of ordinary disaster where, by berating the weather for its perversity, the state covers its lapse in foreseeing the catastrophe or mitigating its effect, presenting them instead as historically specific episodes embedded within a specious claim of exceptionalism. While there is a planetary appeal to Davis' argument, there is an imperative to postcolonialise it as otherwise we risk obscuring specific socio-political

causes that trigger what is increasingly broad-brushed as a global weather anomaly, and ignoring (neo)colonial practices producing specific forms of vulnerability. It is in this effort that this paper begins by taking issue with the emphasis on the 'unprecedented', as it favours an environmental determinism that undermines a critical disaster discourse. As Paul Brass (1986) showed through his analysis of the Bihar Famine of 1966–67, the notion of the unprecedented is a political invention that has no standing in the definitions of social science. It masks the fact that the crisis situation is generally less of a deviation from the normal, often falling in place within a classic sequence of recurring flood and drought. At the same time, there needs to be some sensitivity in challenging this perception as we try and explain this scepticism to those affected, whose personal sense of calamity is unforeseen.

Additionally, in the case of Chennai, against accusations by environmental activists that urban development practices and their lack of respectful mutuality in the human–environment interaction were to blame for the disaster, both the regional and the national state were keen on retelling the disaster as a global weather anomaly. Thus, in light of the COP21 meeting held in Paris a few days after the catastrophic December floods, Prime Minister Narendra Modi blamed climate change for the 'unseasonal rains'. Indian media and environmental agencies picked up observations from the American space agency NASA and UNESCAP (United Nations Economic and Social Commission for Asia and the Pacific) that the record precipitation was unusual, amplified by record-warm seas and the long-distance effects of El Niño. There were even suggestions that the tropical depression that brought heavy rains to the city was the remnant of Typhoon Marilyn, or In-fa which had formed near the Philippines, cutting a wide berth across not just Chennai, but India's east coast and even northern parts of Sri Lanka. Thus, deliberate efforts were made to assimilate the floods into a continuum of calamities cascading across the world with a supposedly planetary connection.[2]

Such interpretations are steeped in a liberal discourse of political denial, where the argument of weather disturbance and upheaval is invoked by the state not just to dispel citizen anxieties but, as shown by the media studies scholar Sturken (2001) in her impressive analysis of the 1997–98 El Niño, this is also a form of narrative that precludes political analysis or action. Through rhetorical manoeuvres, a state rubric is developed around the supposed authority of science to disable more discerning discussions of disaster. Civil society groups in the city are well aware of this tactic, one that hardly advances our scientific understanding of local environmental hazards. Frustrated with a state that wilfully ignores their ecological standpoint that disasters are compounded by the unsustainable dynamics of contemporary urbanisation, activists, over the past few months, have taken to public platforms, demanding accountability for what is essentially a state-propelled urbanisation of disaster.[3] And yet, the state continues to snub them, focusing instead on populist measures such as cash and material compensation. This is tied to the patronage politics as fine-tuned to differing degrees by the two Dravidian regional parties who have been in power in Tamil Nadu since 1967 (DMK and ADMK), and who use significant moments such as the floods to offer material appeals (Wyatt 2013). In a crucial election year (May 2016), the Tamil Nadu State Government is only too aware of the challenge that severe weather events pose to incumbent politicians, as a result of which official post-disaster steps are dictated by electoral interests.[4]

Writing in the aftermath of Katrina, Neil Smith (2006) stressed the importance of putting social science to work as a counterweight against official attempts dismissing Katrina as an inevitable 'natural' disaster. For, it is thanks to the persistence of critical social theorists that we now have the

uncontested axiom in disaster studies: 'there is no such thing as a natural disaster'.[5] While a wide-ranging literature comprising 'the social science of disaster' has contributed to a better understanding of how individuals and institutions respond under catastrophic circumstances, they have unwittingly set off a new sense of unease. Mostly, this has to do with their overwhelming reliance on lexicons such as risk, resilience, vulnerability and mitigation, constructs that have been co-opted by policymakers for their own gain, and matter less to those affected. It is also that there is something to the 'nature' of 21st-century urban disasters that begs a rethink, one that draws from not a fixed position but a series of positionings where, simply tagging disasters as social is not enough, insufficient as it is to unravel the complex spatial and environmental histories behind disasters. It is in pursuit of a better theoretical framework for such a task that Gotham and Greenberg (2014) suggest forging a link between the currently separate scholarship of disaster studies and urban studies, two fields that rarely converse with each other. Their reasoning is not only to connect disaster events to the broader contexts of urbanisation and social change, but to address specifically how social forces that produce systemic risk and vulnerability are themselves embedded within a longer genealogy of capitalist urbanisation. In challenging the discursive rationale of an unprecedented weather anomaly as presented in the aftermath of the Chennai floods, this paper follows their suggestion, undertaking a more cogent debunking of the deeply engrained prejudices about disasters, identifying especially the contradictions nested within their reference to a landscape of risk and resilience. In particular, the focus is to demystify and dismantle three commonly invoked arguments that sought to transgress attempts at any kind of environmental common sense: (1) the 100-year flood fallacy; (2) the ensuing debates around environmental knowledge and subjectivities; and (3) the need to spatially rescale (and regionalise) our understanding of 'urbanisation of disaster'.

The 100-year flood fallacy

In the days immediately following the November and December rains, there was a burst of interest in all things related to meteorology, as it became for some key actors (i.e. politicians, policymakers and the media) *the* scapegoat lens for explaining the crisis. For instance, satellite-map-based animations by the US space agency NASA highlighting the unprecedented nature of the rainfall were circulated eagerly in an attempt to naturalise the 'extreme weather event' narrative. NASA's effective imagery showed an unusually high intensity of rainfall from 28 November to 4 December, with a special emphasis that 'Chennai, between 1 and 2 December received more rainfall in 24 hours than it had seen on any day since 1901' ('Historic Rainfall Floods Southeast India,' 2015). This was picked up by the local media as alert flash headlines: 'Chennai weather forecast by NASA: Chennai rain broke 100 year old record, says US space agency' (*The Financial Express* 2015). Amidst an on-ground struggle to make sense of the deluge and its aftermath, the 100-year flood rationale emerged as a master narrative whose apocalyptic recital provided, if not an explanation, at least some kind of framing to an event that was supposedly uncontrollable, arbitrary and chaotic. Over the next few months as it was bandied about in policy, media and public discussions with no questions about its scientific rigour, it conveniently served as a smokescreen to avoid the more uncomfortable task of unravelling the complex anatomy of the disaster.

The 100-year flood is a rough schematic that emerged in the 1970s as Western governments tried to calibrate flood frequency in a statistical manner compatible with the rise of the flood insurance industry. Its relativism notwithstanding (supposedly to allow a level

comparison of areas of risk), its reckless public invocation has resulted in it becoming a highly compromised and misunderstood factual piece of information. While even Wikipedia will tell you that the term '100-year flood' does not refer to a flood that occurs once every 100 years, this is precisely what a layperson assumes with none bothering to rectify this misreading. Given their immediate experience with the devastation caused by the floods, the public is comforted by the 100-year flood argument as they set the possibility of the disaster happening again at a safe temporal distance, 100 years into the remote future. It is this blending of science with sentiment that fails to clarify its real meaning: what it indicates is a 1% chance of flooding in any given year. As Pielke (1999) explained, in terms of cumulative probability there is a greater than 26% chance that we will see at least one 100-year flood over a period of 30 years (and, similarly, more than a 74% chance over 100 years). There is as well the fundamental question over its credibility as an explanatory science. In what is essentially seen as a 'statistical abstraction' (Davis 1995, 230) manipulating an idealised parameter (ignoring the diversity and complexity of floods as a real phenomenon and forcing a selective extraction of data or facts), Baker (1994, 145) dismisses the 100-year flood as a doubly fallacious term:

> 'These words, of course, have essentially nothing to do with real years or with real floods. Instead, the words represent an idealization based on (often fallacious) assumptions. They are an example, not of science, but of an insidious form of philosophical nominalism … it is a particularly weak form of reasoning, induction, which generalizes from specific cases.'

As an applied science, its serviceable logic is questionable as it is based on past flood records and is thus subject to considerable errors when it comes to forecasting the exigencies of nature. The greater risk is the consequence of planning decisions that incorporate the 100-year flood framing into policies, with assumptions based on a static model of nature. Failing to recognise that the 100-year flood is, in reality, dynamic and needs to be redefined with every new flood event leads to dead-on-arrival regulatory standards that barely withstand the next sequence of floods and needs to be constantly revised. This is precisely why Davis (1995) passionately argues that the 100-year flood is based not only on a fictional ecological history, but also on mechanistic periodicities which do not accommodate the complexity of a natural drainage pattern that is evolving and shifting with every successive flood.

There is a bigger problem with the 100-year flood mode of historical referencing which is that it uses rainfall data to emphasise the 'record' more than anything else. Compounded as we are by the brevity of our hydrological documentation, there is hardly any supporting information to be gleaned from precipitation registers which simply reveal the amount of rainfall received in a given day, month or year. Prone to numerical sensationalism, we allow a discourse at the lowest common denominator to flourish. What does the Meteorological department seek to convey when it reels out its numbers: 'Chennai had 246.5 mm rainfall in the last 24 hours which breaks the record of November 2005 which saw 142.4 mm … the highest rainfall during the north-east monsoon was in November 1976, when the city recorded a rainfall of 452.4 mm' (*The Indian Express* 2015). While such foreboding declarations are meant to exaggerate the paranoia of a big weather story, it is drawn from a sketchy analytical terrain precluding a more sophisticated understanding of the event. Disadvantaged as we are by this blunt empiricism, Davis (1995) rails against the imaginary norms and averages that are constantly invoked as standards. Merely an abstraction, nothing is less likely to occur than average rainfall. As he astutely points out, the chance of the annual precipitation hitting the average mark is probably only a few

times in the history of measured rainfall. The actual norm is an oscillation between dry and humid periods. Sometimes, the annual average is delivered during the course of a month and a couple of storms. At other times, it may take two or even three drought years to achieve the same total.

If we are to persist with a statistical investigation of weather as an omnipresent discursive trope, the big question is why we fail to draw a meaningful pattern from the de facto numbers, treating each instance exceeding the 'average' as unique. This is partially because even though we have a precipitation log since the beginning of the 20th century, our historical knowledge of floods relies on a less scientific form of repository involving archives and oral histories. Anecdotal recollections from a few sources mention episodes of flooding in 1903, 1918, 1943, 1969, 1976, 1985, 1996, 1998 and 2005. There are specific accounts in addition about concentrated flooding in parts of Chennai in 2002, 2004 and 2010. Figure 1 provides Chennai's precipitation summary since 1901 (the years with acknowledged flooding area highlighted in dark grey while the ones in light grey show comparable rainfall but no record of floods). Bearing in mind that while excessive rainfall often leads to flooding, it is not something that is immanent in nature. Looking at the numbers forces a few 'thinking out loud' questions: (1) 1903 was one of the earliest recorded flood events in the city's history when it received nearly 2000 mm of annual rainfall, with an unusually high amount in December (466.35 mm was the highest till 2015 surpassed this figure with 539 mm). Even though we have little information about the geography of flooding in these two different epochs and there are several unaccounted for variables, purely on a numerical basis, one cannot help question a century's worth of modernisation and development if the city remains susceptible to the same amount of rainfall as it was 100 years ago. (2) If these numbers hint at some possibility of a speculative analysis, then one obvious indication is of a recurring frequency of floods with similar patterns of excessive rainfall, at a closer range than the mythical 100 years. A recent report *Why Urban India Floods* (DownToEarth Publication 2016) by the Delhi-based Centre for Science and Environment (CSE) mentions at least seven major flood events in Chennai since 2000. Also acknowledged by many is the fact that what Chennai experienced in 2015 is not very different from the rainfall pattern of 2005, with clearly tenable links and potential lessons to be learnt. In persistently viewing each flood year as a tightly circumscribed statistical artefact refusing parallels with previous episodes, we are left with a weakly constituted knowledge that precludes a more insightful analysis. This is further compounded by an almost non-existent critical scholarship of the milestone 2005 floods, especially from the social science of disaster perspective. If we are to draw a critical analysis that is more than a speculation, we need to approach this historic data as an analytic, not simply a mathematical register. But in our eagerness to sustain the pretence of exceptionalism, we ignore the precedents staring at us in the eye stripping them of their analytically pliable referential meanings. Harsh though it might seem to those affected, the month-long torment that the inhabitants suffered was little different from the classic pattern (except perhaps in the unusual intensity of rainfall), compelling us to reconsider the allure of explanations such as the 100-year flood. If any concessions are to be made as to the extraordinary nature of the floods, then it is in regarding them as the 'worst', reflecting an unparalleled exposure rather than an unprecedented phenomenon.

Environmental knowledge and subjectivities

In the wake of the December floods, the national television channel NDTV ran a coverage declaring 'In Chennai Floods, Middle Class Among the Hardest Hit' (NDTV 2015). In this reportage, the channel profiled

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1901	40.45	62.435	0.353	1.353	12.457	18.408	131.688	162.222	120.167	198.434	304.773	382.866	1435.606
1902	31.613	15.289	0.023	2.571	15.495	21.186	89.26	139.28	163.452	432.433	206.519	193.977	1311.098
1903	60.546	13.373	0	0	165.018	52.657	102.674	163.47	289.82	192.455	490.54	466.346	1996.899
1904	30.51	0	0	0	40.575	14.577	151.738	64.338	96.402	134.355	10.692	68.305	611.492
1905	23.1	39.407	22.514	30.526	9.865	43.271	59.71	173.428	60.562	402.585	206.647	8.495	1080.11
1906	39.448	40.595	27.133	0	4.223	61.342	109.492	168.051	186.644	92.509	136.345	349.991	1215.773
1907	0.665	0	1.235	19.613	2.423	54.107	74.128	84.294	79.345	235.806	336.737	119.642	1007.995
1908	1.059	27.617	0	0.493	10.029	19.715	70.192	104.752	238.336	438.157	191.432	36.214	1137.996
1909	70.49	4.06	0	43.033	140.127	32.091	91.625	181.595	208.334	49.23	75.178	13.908	909.671
1910	1.377	2.493	0	6.93	17.904	60.275	195.449	140.857	112.382	259.917	319.412	1.435	1118.431
1911	0.023	0	0.312	5.809	8.677	19.859	54.572	72.43	180.731	124.225	267.289	197.872	931.799
1912	18.745	0	0	0	1.824	25.777	69.414	197.648	77.562	377.682	555.645	9.351	1333.648
1913	0.023	3.707	0	8.36	63.325	2.536	65.467	45.478	97.799	407.993	288.534	234.946	1218.168
1914	14.275	0	0.823	56.127	5.912	22.805	56.401	222.299	204.664	349.739	316.873	74.417	1324.335
1915	36.874	29.494	13.977	26.597	17.889	37.666	193.217	53.607	215.591	75.359	487.643	18.001	1205.915
1916	0.376	4.729	0	20.801	7	70.044	132.536	113.564	133.863	314.544	310.199	80.808	1188.464
1917	8.304	9.07	0	0	38.191	117.465	107.097	183.983	111.173	298.725	161.776	123.67	1159.454
1918	73.473	33.999	14.696	0	145.337	68.719	18.853	62.534	89.472	12.397	767.891	131.898	1419.269
1919	8.958	0	11.349	0.153	16.019	61.651	181.17	72.311	176.318	184.998	349.434	125.331	1187.692
1920	69.756	0	0	2.928	30.062	18.9	49.519	84.258	38.981	328.009	535.828	1.435	1159.676
1921	82.928	0	0	76.21	5.247	27.353	179.514	184.66	132.858	367.234	101.616	30.762	1188.382
1922	38.778	0	0	2.03	30.237	57.436	79.878	136.853	68.547	358.63	649.648	14.311	1436.348
1923	68.962	0	20.706	0.677	4.575	43.089	41.264	62.077	77.608	250.885	53.003	74.208	697.054
1924	31.534	0	5.822	2.042	13.968	72.251	155.092	82.821	248.806	114.409	304.125	10.396	1041.266
1925	16.955	0	35.652	3.012	108.013	14.458	84.585	197.93	52.36	310.822	314.216	299.477	1437.48
1926	28.957	1.059	2.363	7.778	5.818	14.6	70.177	124.599	70.102	159.938	202.134	25.618	713.143
1927	10.775	4.015	1.871	3.97	23.012	89.999	61.98	80.398	150.123	65.457	299.117	67.393	858.11
1928	16.285	60.18	19.275	20.644	13.472	30.699	65.755	146.771	200.634	393.799	155.373	110.694	1233.581
1929	31.942	39.675	0.177	23.65	24.444	29.797	55.697	108.247	145.905	136.104	325.569	121.568	1042.775
1930	24.157	39.602	0.5	0.558	131.533	78.335	44.955	82.852	104.846	587.562	507.45	106.625	1708.575
1931	2.273	0	0	63.829	52.838	76.184	155.375	85.916	186.149	138.213	314.706	302.993	1378.476
1932	0.023	39.57	0	24.705	25.9	37.381	46.203	63.556	122.713	262.058	245.223	83.595	950.927
1933	2.128	0	11.711	2.994	8.499	14.345	34.35	131.141	32.078	209.648	73.71	325.534	846.138
1934	44.002	0	0	27.766	2.723	80.904	60.447	132.96	43.335	438.007	110.266	39.228	979.638
1935	18.938	0	0	0	0.712	34.33	75.263	274.895	99.177	355.835	100.831	63.907	1023.888
1936	1.229	48.267	25.94	20.396	28.616	59.295	116.365	133.292	89.09	116.272	352.659	38.036	1029.457
1937	3.457	1.358	0.429	72.367	11.082	47.297	70.575	151.941	139.05	236.235	515.836	136.695	1386.322
1938	0.023	32.113	20.73	0	25.856	71.623	81.027	136.268	228.774	148.57	4.124	68.062	817.17
1939	23.186	0	8.488	57.241	3.923	24.314	26.998	19.177	152.279	212.253	357.664	19.344	904.867
1940	1.1	0	11.408	6.443	138.878	41.816	89.357	106.404	95.841	186.644	457.727	106.664	1242.282
1941	28.11	3.076	0	6.002	13.691	58.537	64.923	54.621	228.942	228.337	334.143	223.694	1244.076
1942	0.023	2.071	0	10.746	8.359	62.647	27.579	148.162	82.597	120.372	102.578	235.425	800.559
1943	28.06	42.956	0	31.364	112.877	41.314	99.711	129.537	82.765	713.067	245.2	91.843	1618.694
1944	10.952	12.274	36.343	1.96	4.018	95.451	131.471	162.332	151.281	225.935	501.697	256.462	1590.176
1945	0.023	0	0.177	28.103	18.736	14.9	84.513	180.119	180.265	92.357	286.818	11.359	897.37
1946	21.33	35.464	17.417	7.06	47.524	49.676	61.807	141.717	187.277	212.728	515.988	640.322	1938.31
1947	53.494	6.998	4.247	11.401	21.151	49.113	139.103	82.994	150.726	181.568	53.806	26.28	780.881
1948	24.539	7.155	0	11.98	16.848	18.064	73.08	79.121	160.43	180.97	251.914	66.494	890.595
1949	0.476	0	0	26.557	95.715	107.251	144.627	174.901	195.958	121.344	128.018	1.435	996.282
1950	3.951	22.474	1.942	0	71.102	35.924	50.812	164.689	153.205	164.338	97.92	8.135	774.492
1951	0.853	0	4.411	49.034	57.716	37.244	85.079	151.237	83.068	88.393	148.589	1.964	707.588
1952	0.476	37.705	0	2.593	89.506	23.155	56.124	142.341	27.168	117.307	31.396	345.53	873.301
1953	4.43	12.799	0	15.561	8.761	38.204	104.443	71.531	119.375	460.934	97.75	29.963	963.751
1954	38.9	0	3.894	1.441	18.117	12.355	235.349	83.583	73.707	254.031	15.708	243.203	980.288
1955	52.83	3.867	0	46.499	176.742	40.232	81.814	197.118	152.93	199.817	128.586	118.53	1198.965
1956	17.811	1.047	0	34.035	40.029	98.174	89.88	177.516	222.723	252.923	185.575	138.19	1257.903
1957	0.023	26.146	5.712	0	21.248	86.932	82.1	132.752	100.91	208.319	331.739	1.847	997.728
1958	1.695	0.971	0.3	11.878	80.788	41.527	32.045	181.377	48.597	381.176	328.262	60.556	1169.172
1959	0.441	58.856	0	44.677	65.14	46.61	63.828	74.912	103.311	218.608	258.004	25.187	959.574
1960	12.258	0	0.2	2.512	10.285	93.995	103.054	75.956	205.78	145.734	651.873	101.831	1403.478
1961	33.411	48.262	0	2.453	37.305	75.738	168.125	241.576	196.308	178.16	136.937	11.896	1130.171
1962	2.398	9.706	1.547	29.188	124.912	85.487	92.287	243.571	137.995	366.844	75.248	87.298	1256.481
1963	54.709	0	28.862	76.624	12.457	47.374	63.193	145.136	132.104	170.328	313.587	155.32	1199.694
1964	0.023	0	0	0	2.629	14.437	157.677	163.522	122.683	166.866	517.216	17.005	1162.058
1965	6.454	34.219	0	35.049	3.923	33.031	109.953	228.591	104.59	86.259	235.656	294.415	1172.14
1966	33.574	0	0	1.859	100.639	67.227	104.763	203.662	232.469	216.702	505.566	109.856	1576.317
1967	20.552	0	16.227	5.541	102.109	45.415	105.22	292.125	61.305	126.228	112.586	359.024	1246.332
1968	0.2	14.242	0.312	50.005	33.04	46.698	39.919	39.534	98.738	127.655	128.432	154.468	733.243
1969	0.476	0	0	0	54.435	41.116	110.022	134.007	33.656	503.865	341.879	115.77	1375.218
1970	0.464	17.626	1.583	5.012	14.958	47.696	178.397	198.788	114.306	121.814	429.602	10.719	1140.965
1971	13.259	16.281	11.854	23.052	61.807	39.156	112.673	87.774	132.99	351.022	64.463	154.592	1068.923
1972	8.681	0	0	2.506	79.675	73.289	63.551	113.066	78.672	384.08	167.323	402.333	1373.176
1973	0.2	0	0	0	11.723	15.09	79.668	249.647	174.177	214.488	55.864	159.475	960.332
1974	8.775	0	1.642	0.776	40.19	87.738	128.226	96.977	190.502	186.708	117.63	6.289	865.453
1975	8.198	0	0.212	0	5.435	49.109	176.877	182.396	193.346	322.447	341.414	26.578	1306.012
1976	6.035	0	2.212	0	5.312	68.642	166.72	364.627	56.695	351.908	550.269	13.541	1626.961
1977	0.376	11.245	0	10.135	40.348	79.901	74.599	186.657	114.933	460.266	460.281	15.373	1454.114
1978	9.125	24.769	0	39.058	14.536	42.384	94.506	135.347	288.843	130.42	168.817	426.257	1374.062
1979	0.994	24.293	1.141	5.588	124.69	28.212	99.295	82.494	164.229	126.685	510.07	67.218	1234.909
1980	0.547	0	0.759	0.928	25.92	38.634	74.78	148.362	60.747	114.687	397.684	111.204	974.252
1981	35.416	2.075	6.534	6.147	73.02	56.557	185.113	185.366	196.568	346.524	66.243	105.8	1265.363
1982	0.565	0	2.511	10.3	11.654	74.448	123.28	107.61	97.39	129.294	262.047	62.011	881.11
1983	0.035	0	1.523	0.459	53.434	56.505	94.602	194.808	254.248	304.349	91.932	311.055	1362.95
1984	21.078	58.192	18.085	11.286	1.151	50.497	177.823	43.168	239.775	158.826	316.022	121.929	1217.837
1985	49.645	1.722	0.688	26.791	4.981	54.593	185.641	141.94	130.209	115.405	758.912	117.481	1798.508
1986	63.261	42.813	0.082	0.535	5.035	20.532	47.592	57.561	103.093	367.156	145.174	96.086	948.92
1987	1.541	0	15.47	11.548	9.367	73.447	44.168	124.636	36.684	260.469	196.579	317.744	1091.653
1988	0.023	0	0.588	48.347	51.337	29.477	125.841	358.046	203.903	101.169	371.411	97.977	1388.119
1989	5.504	0	25.699	1.523	7.723	91.577	138.574	55.826	241.578	135.998	365.671	130.255	1199.928
1990	9.614	10.675	18.999	0.641	61.131	23.907	62.758	94.741	212.795	383.515	194.189	50.707	1123.672
1991	5.935	2.488	0.306	0.918	5.071	88.443	78.151	116.487	122.46	207.657	375.267	6.326	1009.509
1992	15.274	0	0	0.3	33.191	18.283	80.543	135.651	65.956	122.033	348.91	125.961	946.102
1993	0.353	0.318	0.841	0.817	128.109	68.942	84.341	229.481	64.293	294.568	336.486	286.091	1494.64
1994	0.847	59.235	0.247	1.97	77.484	39.444	66.058	151.224	49.261	331.912	355.806	35.342	1168.83
1995	46.256	1.857	10.376	6.413	55.398	26.284	120.604	372.275	223.909	183.515	153.495	17.521	1217.903
1996	0.988	0.77	0	33.661	32.284	157.982	67.901	85.77	218.46	279.554	259.982	374.415	1511.767
1997	8.851	0	1.012	23.28	6.293	72.541	38.536	91.676	79.875	220.989	617.086	338.405	1498.544
1998	1.205	0.023	0	10.866	47.154	22.407	105.531	153.259	64.596	103.728	315.819	252.369	1076.957
1999	3.892	5.715	0	8.059	13.312	84.009	46.052	187.897	120.967	208.311	158.69	75.501	912.405
2000	1.498	53.976	0.035	14.39	27.954	77.208	108.573	123.98	184.917	236.439	136.547	56.926	1022.443
2001	1.363	0.035	0	22.973	20.324	62.783	105.955	70.783	156.514	347.236	204.658	211.903	1204.527
2002	30.895	4.253	0	0.288	52.47	16.879	49.998	160.659	123.594	287.694	343.537	41.369	1111.636
2004	37.700	0.000	2.600	10.600	232.700	54.600	51.000	49.700	261.700	329.600	257.700	10.800	1298.700
2005	1.200	5.900	0.800	122.700	41.700	22.500	121.000	60.300	121.000	938.700	603.700	442.100	2,481.600
2006	2.600	0.000	17.900	10.600	16.100	59.100	100.900	139.200	134.100	646.600	257.900	20.600	1,405.600
2007	0.000	14.400	0.000	5.300	1.800	100.100	218.700	196.100	161.700	253.700	99.500	242.800	1,294.100
2008	63.100	11.200	114.200	11.700	0.100	65.100	23.000	100.500	97.100	378.000	521.100	6.800	1,391.900
2009	13.100	0.000	0.700	0.000	14.000	11.300	41.800	93.900	73.600	46.500	493.800	259.500	1,048.200
2010	4.700	0.100	0.000	0.000	191.100	120.200	146.000	195.100	107.500	165.600	224.200	263.700	1,418.200
2011	11.800	41.800	0.000	19.400	10.000	118.000	85.600	330.500	235.500	241.100	447.300	147.500	1,688.500
2012	17.000	0.000	0.500	0.000	0.000	21.200	67.300	94.500	164.000	394.300	39.200	134.400	932.400
2013	0.000	16.900	25.100	1.900	1.800	40.300	154.700	194.800	210.200	195.400	174.400	93.700	1,109.200
2014	0.000	7.100	0.000	0.000	30.500	141.600	47.300	210.900	129.600	386.000	182.400	151.200	1286.600
2015											1608.6		2450

Figure 1 Chennai's rainfall data from 1901 to 2015 (Source: Compiled from several sources including Indian Meteorological Department and India Water Portal). Retrieved from http://www.indiawaterportal.org/met_data/) (accessed 24 February 2016).

a typical middle-class family in the southern suburb of Mudichur (touted by many as 'one of the worst affected areas in the city') who had to abandon their home during the floods and returned to find all their belongings (they referred mostly to their consumer goods, i.e. television, washing machine, refrigerator, etc.) damaged beyond repair. Used in the wake of any calamity to the role of gracious do-gooders, the middle class found it difficult to reconcile themselves to occupying the same precarious position of the poor as the 'badly affected'. Resenting being forced into a hat in hand position, the middle-class couple in this particular programme lashed out against the state as they scoffed at the paltry governmental offer of cash and material compensation (Rs. 10,000 to those who lost their homes and Rs. 5000 for those whose homes were damaged plus 10 kilograms of rice and clothing in the form of one free dhoti and saree). As one disgruntled resident said, the Rs. 5000 offered would only be adequate to get someone to clean their premises.

While it is probably an exaggeration to say that the middle class were the worst affected, there is partial truth to the argument that the floods this time wrecked as much havoc on middle-class neighbourhoods as they did on the poorer areas of the city. However, as activist Kela (2015) clarified in his online post, there are differential impacts wherein slums and shantytowns along the river are swept away almost instantly while middle-class localities suffer only considerable inconvenience. The woeful reality is the historic production of uneven flood risk areas where disasters remain a province of the poor living as they do in unstable structures on floodplains, and whose subsistence living is more severely disrupted by a recurring cycle of drought and excessive rains. Thus, as Smith (2006, n.p.) argued in the aftermath of Hurricane Katrina, natural disasters are in essence a social disaster as they 'simply don't flatten landscapes … they deepen and erode the ruts of social difference they encounter'. What is interesting in the specific case of Chennai is the way the 'naturalisation' of social contradictions (cf. Davis 1998) was framed by the two largely affected social groups, the middle class and the poor. Looking at the two in parallel helps us understand better how, in moments of crisis as this, one thinks and acts about the environment as a relevant referential category, not only at a given point of time (especially in a post-flood scenario) but also in terms of changes over time.

In this context, the aftermath of the Chennai floods presents an apt moment to reconsider the continuously shifting nature of environmental knowledge and subjectivities, especially its (re)production through social relations and institutions. Based on his research in the Himalayan district of Kumaon, Agrawal (2005) employed Luke's (1995) Foucauldian notion of environmentality to identify 'environmental subjects' as a category of people for whom the environment as a conceptual domain organises their thinking and in conscious relation to how they perform some of their actions. At the same time, he found that while the environment might have deep ramifications for people's social identity and well-being, their everyday practices and knowledge might not be always shaped by the environment. Pertinent to the debate here is the fact that such subjectivities are constantly made and unmade where, despite a complex knowledge production process, certain forms of knowledge are validated over others. Moreover, while environmental subjectivities are socio-historically constituted, particular conjunctures such as the floods have a major transformative potential, not only offering a critical space for the production of new subjectivities but also providing a terrain within which to foster new socio-environmental practices. This forces us to rethink the material geographies of vulnerability and the practical decisions that are ill-informed by a rather superficial understanding of the crisis, especially in terms of how people perceive their own exposure to disaster and what bearing it might have on the larger flood

narrative. Focusing on the meanings that the middle class and the poor draw out of their environmental knowledge and subjectivities thus provides for interesting revelations. In the aftermath of the floods, an immediate reaction of most of the affected middle-class residents who found themselves evacuating their homes overnight was surprise and shock that their 'brand new' residential developments were in areas vulnerable to the floods.

Over the last decade or two, the southern part of the city has been subject to a rush of urbanisation and development resulting in a massive overhaul of its geography and its natural features. Chennai-based ecologist, Jayshree Vencatesan (2007, 288) rues this forgotten fact:

> 'A large part of south Chennai was historically a flood plain as evidenced by the soil type of the region … Spread over 50 sq. km, it comprised of a large marsh (Pallikaranai marsh), smaller satellite wetlands and large tracts of pasture land. Locally known as Kaiveli (a generic Tamil name for marshes and swamps), the Pallikaranai marsh drained about 250 sq. km. The numerous smaller wetlands that surrounded the marsh served as the only source of irrigation for the area, which thrived on paddy cultivation. This gave the marsh a legendary status since the villages did not have wells or dug-out ponds, which are the norm in the northern districts of Tamil Nadu.'

As a natural resource, it thus was essential during precolonial times that much of this tract remain undeveloped. But during the colonial era, a revenue-based land settlement and administration meant that wetlands were falsely identified firstly as uncultivated land and eventually as wastelands within a state classification of land uses (Vencatesan 2006). This continued into the postcolonial years as a result of which their ecological significance has been largely forgotten and making it easy to transform their use value for speculative developmental purposes. Abused by the state and citizens equally, the marsh came to be used not only as a waste disposal site by the Corporation of Chennai but has also been actively encroached upon for residential and commercial development projects. Over the decades, Pallikaranai marsh has become a key symbol of the environmental degradation of the southern part of Chennai with large-scale infrastructure projects propelling the worst kind of capitalist urbanisation model that completely disregards its natural ecosystem. To paraphrase Ranganathan (2015), the very physicality of the wetlands (and its indeterminacy of ownership) suggests a 'consequential materiality' that is ideal for millennial capital's 'becoming-being'. It is no wonder that by the beginning of the 21st century only 10% of the marsh remained (600 ha).

Initially, there was little recognition of the significance of this loss, as the colonial administration had replaced its associated *eri* (tank or reservoir) system of rainwater catchments and spill-overs with an engineered storm water drainage system. The former is more suited to the city's flat topography, designed as they were to capture slow and gradual movement of water across the landscape through a series of interconnected bunds, but was overlaid with a storm water drainage network whose reliance on gravity in a city with very slight gradient made it difficult to capture flowing water, resulting in stagnant water pools (Jameson and Baud 2016). To this date, state governments prefer the latter despite the fact that *eris* historically served the dual purpose of groundwater recharge and flood management efficiently. As their function was displaced by storm water drains, they have rapidly decreased in numbers amidst a lack of initiative from the state towards their conservation: Chennai had more than 600 waterbodies in the 1980s with only a fraction remaining today (27 according to a report by the National Institute of Disaster Management). And the area of 19 major lakes has shrunk from 1130 ha in the 1980s to around 645 ha in the early 2000s. However, the modern

engineering infrastructure of storm water drains has been inadequate as well in compensating for the loss of this natural system. Thus, with only 855 km of storm water drains against 2847 km of urban roads, even a marginally heavy rainfall causes havoc in the city (DownToEarth Publication 2016).[6]

Ironically, it was the floods of 2002 that brought some awareness to the issue at hand when inundation of residential areas along the marshes combined with health concerns around the burning of the garbage dumped on site rallied residents together with environmental activists in the city to petition the government for remedial and mitigating measures. Eventually, in 2007, 317 ha of the marsh was declared a Reserve Forest. While civil society groups actively involved in this debate view this as a victory of sorts, the 2015 floods showed that such tokenistic gestures are insufficient as the marsh's incapacitation as a natural flood sink proved to be a major reason for flooding in the southern areas of the city. Even though Pallikaranai marsh captured public imagination as a prominent environmental debate in the first decade of the 21st century, dominating often the media headlines, most of Chennai's residents remain unaware of such ecological framings, focusing on specific aspects such as the burning of the garbage rather than the larger concern of floodplain destruction. Such a position confirms Agrawal's (2005) argument that environmental subjectivity reflects one's own knowledge and preference often based on compulsion or short-term interest, and also cautions against the limited possibility of these actions morphing into larger ideological beliefs about the environment. It is thus not surprising when many affected middle-class residents showed little geographical awareness about the ecological destruction wrought by the residential developments they had bought into. Thus, in 'Lessons from Chennai Floods' profiled by *The Hindu Business Line*, middle-class residents complained as to how they bought into the promise of 'lake view' apartments, little realising that they were built on a lake:

> 'I bought that apartment only in June. They said it's a lake view apartment, but the entire place looks like a lake now.' (Nirmal 2015)

Many according to this report were unaware that their residential areas were either built on a lake or a wetland as they claimed they weren't aware of the history of the place. This is unfortunate as something simple such as paying attention to the etymology of place names would have told them more than enough. Thus, most neighbourhood names in southern Chennai finish with either '*akkam*' or '*eri*', with the former referring in Tamil to a location along a waterbody while the later refers to a tank or reservoir. In the above story, residents interviewed were mostly from Perumbakkam, again 'one of the worst affected areas', its misery coming from a little acknowledged and long-forgotten geographical reality.

It isn't that the middle-class residents were not aware of their neighbourhood being in a 'low-lying area', used as they often are to rainwater stagnation of one foot or so during the monsoon period. What they didn't anticipate is the little it took for these low-lying neighbourhoods to quickly sink into flood-prone areas. As the floods emerged as a calamity that the middle class no longer witnessed at a safe distance but one they had to live through, it became clear that the environmental subjectivity of the middle class was not built on ecological awareness, rather their emphasis was on the fact that they were ignorant of any such knowledge. This aspect of not knowing is something anthropologists such as Dilley (2010) have highlighted as critical to investigations of knowledge. The emphasis is on knowledge and ignorance as being mutually constitutive, not simply as an opposition where one is seen as the negation of the other, but more importantly in terms of how a dialectic between knowledge and

ignorance is played out in specific sets of social and political relations. In the context of Chennai's middle class, their claim of lack of knowledge cannot be seen as plain ignorance but a wilful act of refusing to take notice of the environment, especially when they are capable of knowing, and perhaps might even be expected to have some sort of social obligation to know. In a similar vein, Mair et al. (2012) show that ignorance is not so much the lack of knowledge but one that incorporates certain knowledge, logics, ethics, emotions and social relationships. Following this argument, it becomes clear that the middle class, by professing to not know the rules, the ecology of the soil, vulnerability of the land, etc. have become complicit in allowing a certain kind of speculative urbanism to thrive, one that is dependent on practices that are the result of not knowing. Convinced that such knowledge was not essential, their ignorance reinforces a form of knowledge in its own right, acquiring a cognitive content and false consciousness, one that is used to justify their (lack of) environmental subjectivity. What renders this knowing/not knowing dialectic even more incongruous is the fact that most members of the middle class have found their economic prosperity through employment opportunities in a knowledge economy the success of which thrives on an ignorance economy nurtured by state and capital interests. Here, the middle class emphasise their deniability by not only avoiding knowledge but a few also insisted that it is up to the experts to produce information about risk, valorising a bourgeois mode of knowledge production and allowing environmental knowledge to be twisted by political spin. The state playing on middle-class confusions regarding environmental risks and uncertainties is not only able to contort the 'hard facts' of environmental degradation but also convince them to doubt civil society arguments as an exaggeration. 'It cannot be that bad' is what middle-class residents resort to as a response when reminded about the extent of environmental damage to the city's natural features. This is not surprising given Mawdsley's (2009) already established scepticism about the environmental subjectivity of India's urban middle classes. Whatever exists, she argued, carries little traction, signifying an ecologically deficient environmentalism, one that is regressive and authoritarian.

On the other hand, the poor address their vulnerability of living on risky terrain not through deliberate unknowing but a carefully developed system of knowing, one that does not subscribe to the usual domains of knowledge systems and reinforces the limitations of following any kind of local/indigenous/traditional vs. Western/modern/scientific binary. Their perception of an environmentally unsafe situation is premised not on scientific knowledge but a simpler understanding of clear and present danger based on their need for surviving the annual cycle of floods. Drawing from their ethnographic research of risk perception in an Argentinian shantytown, Auyero and Swistun (2008, 369) introduce the notion of 'relational anchoring', that is, the 'cognitive heuristics people use to select and digest information about their environment—and thus their perception of hazards—are relationally anchored in everyday routines'. Driven by the necessity of knowing their hazardous environment, the poor develop a system of noesis to make sense of the inevitability of hazards and the continued disruption of their everyday lives. This is attached to a wider understanding of a risky environment which includes unsanitary living conditions, polluted drinking water and a myriad set of health-related hazards. In this context, floods are one of many risks that need to be balanced and overcome through a carefully constructed set of strategies against multiple others occurring often at the same time. As a result of this continuous exposure, what they tend to do is normalise the risk, not by ignoring it, but by cognitively and materially adapting to it, so that the perceived risk is at least lowered over time (Sara et al. 2016). It is not that

they have become accustomed to the recurring floods, but employ 'diverse knowledge that structures the course of mundane life, ranging from unconscious routines and pragmatic, problem-oriented knowledge to the general socio-cultural framework and its normative instructions for social action' (Ehlert 2012, 18).

Following the 2005 floods and the subsequent announcement by the government in 2009 of a Cooum River Restoration Project, several slum dwellers living along the banks of the Cooum River, including those in the Pudupet area were evicted and relocated to slum resettlement sites in Semmancheri and Kannagi Nagar, 30–40 km south of the city. Disregarding the fact that the latter are part of the now forgotten wetland system, the resettlement exposed the evicted slum dwellers to new kinds of vulnerability. Speaking about their experiences of resettlement, one of them explained clearly their positionality vis-à-vis vulnerability and risk:

> 'Yes, we lived in slums and yes, we lived in river banks. And yes, there were floods often, almost annually, some worse and some not so bad. But we coped with it. Our shelter was constructed with temporary materials (kuccha), and at the first sight of floods we would pick up our belongings and run to higher ground for shelter. Sometimes, we would have relocated all our things elsewhere in anticipation of the floods. At other times, you should see us running for our lives with our belongings on our head. Yes, we suffered when our houses were washed away and we had to rebuild them again. Initially, we agreed to move here thinking this was a better option. But there, everything else was intact: jobs, schools for our children, clinics, everything was nearby and we could access them all. But by relocating us here, this is permanent disaster. There are no jobs, no schools, no hospitals. Nothing. You think this [resettlement site] is not flood-prone. You put us in a swamp. You should see this place when the rains come. It is worse than what we faced along the river banks. We have to wade our way through at least a couple of feet of water and there are all these snakes and other animals whose habitats we have displaced and who are now a constant threat to us.'

Even though they had no grand flood management strategy in place, using tacit knowledge or what Boyer (2008) refers to as 'para-ethnographic' knowledge and adaptive solutions, the poor developed a lifestyle of 'living with floods', one that involved the interweaving of a crude form of meteorological knowledge with their quotidian routine (here we need to resist any tendency to romanticise an indigenous knowledge system based on a perfect but non-existent man/environment relationship). That their vulnerability has been exasperated through these resettlement projects became evident in the 2015 rains when Semmancheri flooded rapidly, cutting off the resettlement sites from disaster assistance.[7] Doshi (2013, 226) in the context of Mumbai's resettlement politics discusses how slum dwellers advance new forms of environmental politics through a subjectivity that is 'produced through the intersecting experiences and politics of redevelopment, displacement, and ecology'. However, it is hard to share her optimism that 'the spatial and relational production of environmental subjectivity among evicted slum-dwellers is key to urban spatial transformation and possibilities for social justice' (245). By the end of December 2015, in a show of quick post-floods action, officials from the Corporation of Chennai began an eviction drive clearing slums along the Adyar River. Slum dwellers from areas such as Thideer Nagar where they have lived for generations found themselves joining their counterparts from Pudupet in resettlement sites close to Semmancheri (their destination being another low-lying marshland, Ezhil Nagar in Okkiyam Thoraipakkam). Barely had they emerged from the month-long misery when the stark reality of floods-as-disaster compelled them to rethink their everyday relations with hazardscape (cf. Mustafa 2005) that they were plunged into a

nightmare, once again (and a long-lasting one), through this relocation.

The troubling aspect here is that such institutional decisions which can only be deemed as regressive were not even informed by an expert knowledge but an arbitrary decision-making process that overrides any form of knowledge system providing a suitably different reading of environmental change (especially one that holds the state accountable as an environmental subject). Accompanying this is the usual hogwash of heavy-handed solutions for controlling flood and other ecological risks. Such responses are reactions to the floods as a specific shock rather than considering the challenge of a continuous process of water management through a hydrological cycle. Led by middling bureaucrats who take little into account of the diversity of people's ecological framings, hard sciences continue to dominate policymaking. Disregarding the historic, generative causes of such risk and the myriad subtle connections between humans and nature, this misplaced belief in artifice's ability to tame nature has led to a chronic reliance on flood-control technologies as the undisputed answer to tackling such disasters in the future.

In the case of Chennai, one of the major causes of the 2015 floods was the blocking of Okkiyam Maduvu, a channel which in the natural scheme of things is crucial to draining excess rainwater from the Pallikaranai marsh into the sea. But at 16 km from the sea, this is a slow process of drainage, firstly into the man-made Buckingham Canal which in turn discharges into the Kovalam estuary. In 2009, acknowledging the length of time this takes, a flood alleviation programme proposed the construction of a short-cut diversion channel that would drain rainwater directly from Buckingham Canal to the sea, one that would be faster than the slower system of marshland natural drainage. Even though the Comptroller and Auditor General (CAG) in its 2014 report reproached the government for defective planning of flood-control projects in Chennai, it is disheartening to see its emphasis on techno-engineering solutions as it endorsed schemes for short, straight canals and flood protection walls, sanctioning controversial land acquisition as well as clearing of encroachments to meet the alignment criteria of such schemes. Thus, in the aftermath of the 2015 floods, the Tamil Nadu State Government Chief Minister Jayalalithaa announced that a detailed investigation would be taken to have a regulated canal (straight cut) directly to the sea from the Buckingham Canal, adjoining Okkiyam Maduvu. This, she believed, would be the best long-term solution for not only ensuring faster discharge of surplus water during heavy rainfall but also allow a certain amount of fresh water to remain in the wetland. One can only be wary of such solutions especially in light of Das's (2014) scepticism about effective flood-control planning which according to him has lost out to the political economy of corruption and the inefficiencies intrinsic to a system at the mercy of patronage relationships. Such solutions are not even about the challenges of expertise-driven planning prioritising professional knowledge and practices but about the blind spot created by a state-driven assumption that risk can be managed with engineering solutions. In this collapse of a socio-natural understanding of environmental risk, the greatest challenge is our failure to acknowledge that 'a single hazard in a place is the outcome of interactions of geographical variables across spatial scales' (Mustafa 2005, 566).

Rescaling the 'urbanisation of disaster' discourse

Barely had the city recovered from the 1200 mm of rainfall it had received during the month of November (generally considered to be the city's annual quota) when, between 1 and 2 December, the city received 345 mm of rain, a much-touted meteorological record over a 24-hour period in the month of December (the previous maximum of

261.2 mm was 114 years ago in 1901). In the following days, Chennai witnessed the worst of the floods, one that was exasperated by two factors. First is the spatial variability of rainfall as more rains lashed peripheral areas than the city, wherein against the city's 35 cm there was 49 cm of rainfall in Tambaram (south-west in Kanchipuram district), 47 cm in Chembarambakkam (west in Kanchipuram district) and Ponneri (north in Thiruvallur district) received 39 cm. A Rapid Assessment Report produced by the Indian Institute of Science and Indian Institute of Technology (2016) observed that the 24-hour rainfall in the city was more like a 25-year storm (rainfall intensity peaking at 35 mm/h) whereas that recorded in Chembarambakkam on the outskirts was more like a 100-year storm (rainfall intensity peaking at nearly 60 mm/h). With the natural rainwater drains, run-offs and spill-overs blocked off by a reckless and unregulated process of peri-urbanisation, excess water quickly breached the shrunken tanks, reservoirs and canals, flooding initially the surrounding areas and eventually the city. Second is the controversial decision of the state government to release 29,000 cubic feet per second (cusecs) of water from Chembarambakkam reservoir. According to official reports, on the afternoon of 1 December, as the reservoir was reaching its maximum capacity (3645 million cubic feet), the Chennai district collector issued a press statement that water will be released from the reservoir at the rate of 5000 cusecs, possibly increasing the overflow to 7500 cusecs, and advised people residing along the banks of the Adyar River to move to safer areas. By the morning of 2 December, with most areas of Chennai within a radius of 7 km on either side of the Adyar River under water, it was clear that this was simply not from heavy rainfall and that more than 7500 cusecs had to have been released to unleash this kind of damage.[8] That those in charge underestimated the implications of the river's wider geographical basin was apparent from this particular disaster.

There are three major rivers flowing through the Chennai Metropolitan Area (CMA), Kosasthalaiyar, Cooum and Adyar, each of them being part of a larger, regional watershed system, with their own defining characteristics. The CMA covers 1189 km^2 over three districts (176 km^2 of Chennai district, 637 km^2 of Thiruvallur district and 376 km^2 of Kanchipuram district) (Figure 2). The Kosasthalaiyar River originates about 100 km from Chennai to the north-west in North Arcot district, with its main branch feeding the Poondi reservoir (the largest in the city), before travelling through Thiruvallur district and the CMA, finally joining the sea at Ennore Creek. The Cooum River is a bifurcation from the main Kosasthalaiyar River, flowing mostly through Kanchipuram district before entering the city and draining at Napier's Bridge into the sea. The Adyar River has modest beginnings from Malaipattu tank near Sriperumbudur in Kanchipuram district, appearing only as a stream from the point where water from Chembarambakkam tank joins the river. Cooum and Adyar constitute two important rivers in the city, marking geographically, during the city's colonial foundations, its northern and southern boundaries. Even though within the CMA both the rivers cut across in an easterly direction to a short distance of 24 km, they are very different as river basins. Thus, the Cooum River, 72 km in total length, has a macro drainage area of 502 km^2, carrying the surplus from 75 tanks in its catchment area and a bankfull discharge of 991 m^3/s. On the other hand, the Adyar River is a shorter 42 km, with a larger macro drainage area of 720 km^2, 450 tanks feeding into it and has a bankfull discharge of 2038 m^3/s, twice that of the Cooum River (Narasimhan et al. 2016). It is therefore not surprising that most historic accounts of Chennai's earlier floods often refer in particular to the flooding of the Adyar River. In the specific context of the December 2015 floods, even though the outflow from Chembarambakkam tank itself was only 800 m^3/s, the

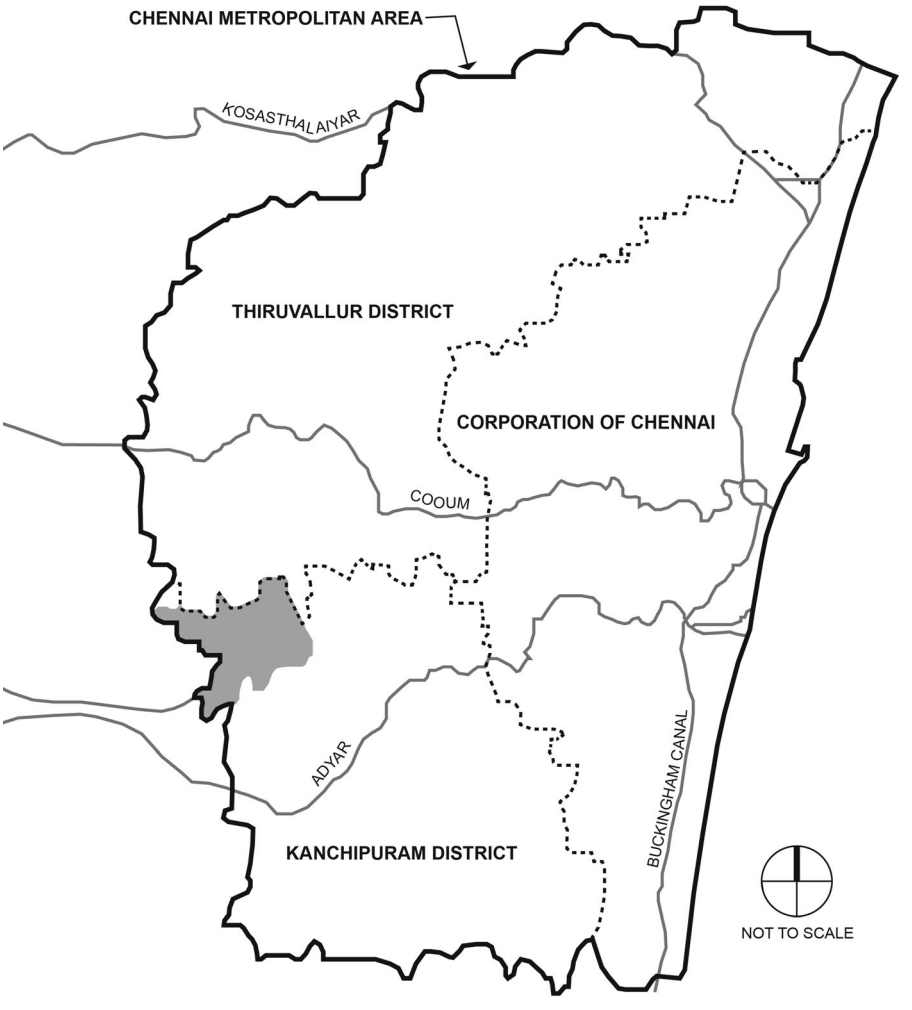

Figure 2 Chennai's city and metropolitan boundaries with its river systems.

overflow from its inter-linked system of smaller *eris*, canals and drains meant that the flood flow of the river peaked at 3800 m^3/s, exceeding 60,000 cusecs of water (way beyond its capacity of 40,000 cusecs).

The frustrating aspect of this debate around why and should the government have released so much water from Chembarambakkam tank with such little notice is that this is not the first time surplus water from Chembarambakkam tank has been released under similar circumstances exasperating an existing flood-like situation in the city. Earlier in November, 18,000 cusecs of water had been released with calamitous flooding in the nearby neighbourhoods of Mudichur, West Tambaram and Manapakkam. Even though some noise had been made over its disastrous consequences, given their peripheral location, it didn't raise as much concern as the one that followed the December deluge. While similar amounts of water had been let out from Poondi reservoir into the Cooum River, with not so much rainfall in its catchment area and its differing nature of flood water discharge meant that there was minimal flooding of the Cooum River. But Chembarambakkam has its own precedents

which were conveniently ignored. On the night of 24 November 1976, facing the consequences of a severe cyclonic storm, state officials released 28,000 cusecs of water with deadly flooding of settlements and neighbourhoods along the Adyar riverbanks (EPW 1976). This practice continued through almost every single major flood episode in the city (1985, 1996, 2005 and 2008). While the government was quick to release a press statement defending its decision, it shows the need to understand better the hydrological regimes of Chennai's river systems and its associated socio-natural risks. While such disasters echo the futility of command and control schemes managed by engineers and flood mitigation experts deferring to the decisions of bureaucrats and politicians, there is an urgent need for tackling floods as complex riverine phenomena whose dynamics are framed by a geomorphology of a wider floodplain. This is also perhaps one instance where we would be better served looking backwards rather than forwards. Thus, alongside a tendency to populate the debate with a spate of mostly scientific and quantitative analyses of flooding through georeferencing, hydrological modelling and generating impressive GIS (geographical information system) as well as remote sensing maps, what is equally required is a critical historiography of how specific watershed areas have been socio-politically manipulated and transformed.

This is particularly pertinent in the case of Chembarambakkam tank and its metamorphosis from an irrigation tank to a standby water supply reservoir for the city. Until the 1990s, Chembarambakkam was a historic irrigation tank feeding the paddy fields of the surrounding 168 agricultural villages, covering a catchment area of 357 km^2 (Kolappan 2015). It is crucial to the Adyar River sub-basin controlling nearly 40% of its water with the remaining 60% coming from other major and minor tanks upstream. Understanding this is crucial as the upper catchment area (including the Chembarambakkam tank) occupies 75% of the total area of the Adyar River sub-basin and has a major say in the way the river floods and thereby affects the city which is further downstream (Vidyapriya et al. 2012; Figure 3). In the early 1990s, based on the World Bank practice of encouraging inter-sectoral reallocation of irrigation water using precedents of buying out farmers' rights to irrigation tanks (especially in peri-urban contexts), the state government of Tamil Nadu sanctioned the reallocation of the tank from irrigation to general purposes (in this context, specifically for Chennai's drinking water supply). Since 2000, the tank has been used to convey water to Porur Lake as well as a reservoir for the diverted water from the Krishna Water Supply Project, alongside the construction of a 540 mld water treatment plant on site. We cannot pick too many bones here over its transformation as Swyngedouw (2009) reminds us that hydraulic environments are in essence socio-physical constructions that are actively and historically produced and thus there is nothing a priori unnatural about reconstructing them as large-scale water infrastructure projects. However, what is worrying is the resulting environmental change where, over the past two decades, an intricate system of established agricultural canals that used to lead out of the tank has disappeared. This can be mainly attributed to the specific pattern of peri-urbanisation following the re-designation of the nearby town of Sriperumbudur as a Special Economic Zone (SEZ) and its related development as an industrial corridor attracting global automotive and telecommunication industries. Referred to as India's 'new Shenzhen' (Homm and Bohle 2012), the area has witnessed a rapid depletion of its sensitive natural habitat, privileging the growth of factories over flora and fauna. It is not surprising that most of these plants (including Hyundai, Renault-Nissan, Daimler, Ford, etc.) quickly submerged in water suspending their operations for several days. Also, by dumbing the tank down from its complex function as an irrigation reservoir to a surface-water conservation

Figure 3 Chennai Metropolitan Area in the context of the Chennai River basin and the Adyar River sub-basin.

reservoir, state bureaucrats and technocrats did not address all factors such a shift entails. Thus, every time the state has tried using Chembarambakkam as a flood-control reservoir, it has failed miserably. As one of the largest tanks in the CMA, its design was meant for irrigation purposes, with an exit as high as possible to irrigate maximum land. But for urban water supply and flood management the exit needs to be low with overflow across a minimum surface area. In re-imagining the tank from a surplus to a scarcity reservoir, state authorities have tampered with its socio-hydrological function, irreparably changing its relationship with its wider landscape without rectifying its original physiography.

This pushes us to question once again the prevalent emphasis on expertise, questioning the social figure of the expert and its epistemic consequences (Boyer 2008). Often based on a flawed logic, their decisions have continually made the city more vulnerable. What is also annoying is the way they

invoke inevitability as an inchoate reasoning, in this case, letting the water out being inevitable, reminding us of Kelman's (2006) argument that assuming inevitability is less elegant and more damaging as it leaves no room for contingency. Following stringent criticism of the government's decision to release water from Chembarambakkam tank, the Chief Secretary to the Government of Tamil Nadu issued a press note on 13 December emphasising that they followed the Rules for Flood Regulation as stipulated in the Compendium of Rules of Regulation of the Public Works Department which requires the state to '*balance the interests of water storage for the scarcity period, the need to control flooding in downstream areas and the safety of the reservoir*' (original emphasis).[9] But as already noted, achieving this balance is impossible given the contradictory operational mechanisms embedded in the function of a water storage versus a flood-control reservoir. Denying the interference of bureaucrats and politicians, the press statement emphasised the 'engineer' as the competent authority, reinforcing their role in the technical management of urban space within regional industrial systems (Gandy 1997). Disregarding the possibility of following meteorological predictions to make decisions well ahead in time, there was once again a statistical simplification of the de facto pattern of rainfall, where much of the explanation suggests a tendency to mistake correlation for causation, imprisoning the discourse of floods within a narrow ecological imagination.

The December floods indicate even more the need to consider the aggregate of extreme events over an expanded sense of the region. There is an unevenness to urbanisation with substantial local variations, which combined with an increasingly heterogeneous rainfall spread requires us to widen the scope of a hydro-meteorological region for any kind of useful analysis. Thus, a simple 'urbanisation of disaster' argument pointing to disaster risk as a manifestation of urban growth and its depleting effects on ecosystems is insufficient. Rescaling our dissection of Chennai floods as a peri-urbanisation and regionalisation of disaster shows that neither is the ecosystem secure at this scale nor can we assume that looking at the watershed or river basin will promote a better holistic understanding of human–environment relations. Nevertheless, rethinking the socio-natural risks of floods in the 21st century is better served by rescaling its ramifications beyond a city or even metropolitan demarcations (defined arbitrarily by the convenience of governance structures) and redrawing ecosystem boundaries to a biophysically determined region. In this context, the December floods forces us also to address the fact that what we are dealing with here is not a plain hydrological cycle but a more complex hybridised form of socio-natural flow, one that is nested within an unstable scalar configuration that is perpetually constructed and reconstructed (Swyngedouw 2004).

Final remarks: the futility of resilience

The irony here is that only a year earlier, in December 2014, Chennai was amongst three Indian cities (including Surat and Bangalore) selected to the proud roster of 35 cities joining the 100 Resilient Cities Programme set up by the Rockefeller Foundation (with a funding of $100 million), a pioneering initiative to help cities around the world become more resilient to the physical, social and economic challenges of the 21st century. According to a statement released by the network, Chennai was chosen based on a coordinated disaster response plan developed in the aftermath of the 2004 Indian Ocean tsunami. In addition, it appreciated the city for making efforts to build on experience, learning from past events and continuing to provide best-practice solutions to other regions. And yet, as this paper establishes, this is pure drivel given the way the city has treated every disaster as 'unprecedented' and there is little jurisprudence to the way policies are proposed in

their aftermath. One of the first steps emerging from the 100 Resilient Cities Programme was the purported appointment of a Chief Resilience Office for the city, a position that remains unfilled even in the wake of the December floods. There has, however, been no end to the numerous workshops conducted and reports produced since the beginning of 2016. While some are useful, most simply perpetuate the tripe that dominates these conversations. Typically, they bring together a diverse range of international and local experts to identify best practices and tangible ideas that could help Chennai become more flood resistant in the future. Recommendations generally include mega-engineering solutions such as redirecting the flows of rivers (actions that were responsible for the floods in the first place), and construction of artificial channels and outlets, all offered by a multitude of global consultancies seeking lucrative contracts. Even though some caution against overreliance on technical responses, most wilfully ignore the critical issue of disappearing wetlands, floodplains and waterbodies. It makes us question the usefulness of a resilience discourse, especially one that unquestioningly transmits scientific information from a known, intentional source (the experts) to a passive set of willing recipients, that is, the state authorities and the public. The problem here is that such expertise is underwritten by professional and institutional knowledge and practices (mostly from the outside), prioritising tangible and visible solutions. There is also a sense of pointlessness to such deliberations as they merely join a long line of schemes that have been enthusiastically proposed but rarely implemented. Over the years, state officials have announced any number of flood protection strategies, both structural and non-structural, but as a CAG audit for 2013 and 2014 found most of these suffer from an endless spiral of delayed decision-making and increasing costs.

The other vexing issue with resilience is its promulgation of a culture of optimism where cities always bounce back as they are rebuilt all the time. Taking for granted their durability, the premise of post-disaster urbanism is that modern cities almost always recover from disaster. It detracts us from addressing its conflict-ridden nature as well as questions about equity. This is flagged by Vale and Campanella (2005) who find that resilience as a function of political power is perhaps nothing more than a rhetorical device. Cultivating a prematurely progressive narrative, its manipulation by capital makes it inherently controversial. It is thus difficult to share the enthusiasm of the *City* journal debate where Taylor and Schafran (2016) maintain that resilience can be redeemed if it critically engages with the everyday and actually existing politics and processes, and that it can be a means of both imagining and building better urban futures. If one goes by the simple definition of resilience as the ability to bounce back, then yes, Chennai has demonstrated remarkable resilience in the aftermath of the devastating floods. Within a few weeks, scant traces of disaster remained (mostly seen in garbage pile ups and abandoned cars), as the city seemed to recoup its losses as quickly as possible. But to seek comfort in such a capability engenders a false sense of confidence, till the next disaster strikes. The concern about employing a resilience discourse here is not even in terms of it possibly being a neo-liberal connotation (cf. Zeiderman 2016), but at a simpler level. By focusing on resilience, city governance officials do not bother to fix the problems at hand, or if they do, it is done shoddily, only making the problems worse, as seen in state responses to averting a flood-like situation again in the future. In this case, risk signifies a condition where human and non-human threats are constantly looming, thus becoming the new parable to justify brutal political actions such as evicting slum dwellers from the riverbanks barely a few weeks after the floods. The immediacy of the disaster allows a constitutive relationship between politics and risk, invoking key framings of the resilience discourse including vulnerability, mitigation, threat, etc. to set aside

rights and entitlement arguments of the urban poor and justify their resettlement. Arguments such as the right to the city as invoked by the urban poor in their struggles to assert some semblance of citizenship is disenabled by the idiom of resilience.

It is not just the poor who have had to bear the brunt but also civil society activists whose efforts at highlighting the environmental risks posed by capitalist modes of urbanisation, and calling for immediate as well as long-term remedial action have been neatly sidestepped by the state, dismissing their hard facts as their usual rant. With no possibility of a state–civil society alliance in the future, at least as far as environmental actions are concerned, in the post-floods scenario, we are left with an environmental subjectivity that shows little promise of being socio-ecologically progressive. This pessimism is seen in Catterall's (2016, 2–8) reflection that the breakdown that ensued was

> 'on the one hand, an example of the fragility of our technological condition, an intricate array of communication systems and work patterns, at a time of increasing globalisation and acute climate change, but also, on the other, of the fragility of our knowledge and understanding of our condition, and underlying this despite easy talk … about contestation, of reform versus revolution (now safely evaded through resilience?) the creation/destruction opposition (now safely amalgated?), of "urban" versus the rural and "the city", of commodities and commodification, paradigms and epistemologies. … These are insecure foundations.'

His biggest concern is however

> 'An approach to urbanisation that marginalises the earthy riverrun planet, the commodification of knowledge that supports such marginalisation, such are the insecure foundations that sanitised new epistemologies hide and that a genuine paradigm shift needs to secure.'

As the disaster hangover slowly fades away, and we forget the complexity of factors comprising the root cause, the paradigm shift that Catterall (2016) calls for seems far away given the continued preference of the state and its allied actors for the legitimacy of probability and statistically driven inputs. Thus, when the Chief Secretary to the Government of Tamil Nadu insists that the floods were a 'rarest of rare natural calamity' and that the flooding was caused primarily due to very heavy rainfall, it makes us wonder if we are being naive in suggesting the possibility of an alternative culture of knowledge, and believing that it will provide ammunition for a more critical approach in the future.

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Notes

1 #Chennairainshelp and @ChennaiRainsOrg were amongst the prominent ones who provided an information platform to help Chennaiites during the floods.
2 The comment about 'unseasonal rains' shows the lack of geometeorological knowledge amongst India's leaders who generally assume that the entire country is served by the South-west or summer monsoons (June–September). Tamil Nadu is part of the minor group of south-eastern states in India who receive almost 50% of their annual rainfall from the North-west or winter monsoons (October–December). Regarding the construction of the event as a global weather anomaly, see Bell (2015).
3 Nithyanand Jayaraman is one environmental activist who has berated the state and its allied capitalist interests (including mega-infrastructure projects) for incapacitating the city against the onslaught of

monsoons. See his post that appeared in http://scroll.in/article/769928/chennai-floods-are-not-a-natural-disaster-theyve-been-created-by-unrestrained-construction (accessed 24 February 2016).

4 The combination of largely material-based clientalism and patronage politics with programmatic policies is characteristic of the Dravidian parties that have ruled Tamil Nadu since 1967. See Wyatt (2013) for a more detailed discussion of the differentiating nuances. In the May 2016 Assembly elections to the state of Tamil Nadu, the ruling party ADMK managed to retain power but suffered electoral losses in 10 out of 16 Chennai constituencies, attributed by many to their poor ground action during the floods.

5 When Neil Smith (2006) wrote that there is no such thing as a natural disaster, he was picking up on the common adage that hazards are natural while disasters are man-made.

6 This figure is contradicted by the Corporation of Chennai which claims that it maintains a Storm Water Drain network of 1660.31 km within the city against 6000 km of roads. Whatever the number, it shows that less than 30% of the city's roads are lined with the necessary service infrastructure.

7 Again, the lack of etymological knowledge regarding place names is clear as one needs to only look at the suffix *eri* in Semmancheri to understand its original role as a reservoir.

8 I am grateful to Sandhya Ravishankar's in-depth analysis that appeared in thewire.in on this particular aspect of the Chennai floods. Retrieved from http://thewire.in/17468/as-chennai-flooded-officials-fiddled/ (accessed 28 July 2016).

9 Press Note No. 188 released on 13 December 2015. Retrieved from http://www.tn.gov.in/pressrelease/archives (accessed 26 July 2016).

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