Water Sector Reconstruction for Post-disaster Housing Settlements: A Tale of Two Governance Models

Luke Juran, Robert D. Oliver, and Dustin C. Read

Abstract The 2004 tsunami impacted coastal India resulting in thousands of mortalities and hundreds of thousands displaced. The aftermath elicited the largest reconstruction effort in India's history. This study investigates reconstruction in the adjacent territories of Nagapattinam District (Tamil Nadu) and Karaikal District (Puducherry). While both territories deployed virtually identical public–private partnership frameworks consisting of Memoranda of Understandings between the governments and humanitarian organizations, the models deployed to manage reconstruction differed. In Nagapattinam, a collaborative model was executed in which various public agencies were responsible for their respective reconstruction activities. Meanwhile, Karaikal exercised a single agency model under which a standalone public agency assumed responsibility for reconstruction activities. By linking primary data to the theoretical literature, this study examines outcomes of the two governance models through the lens of water. In this case, findings suggest that the collaborative approach—while seemingly more holistic and participatory—produced inferior outcomes due to issues of coordination, bureaucratic layering, and project organization. This outcome, which is incongruent with many theories on governance, development, and project management, is problematized and discussed as are strategies to better integrate the water sector into disaster and urban planning.

Keywords Disaster policy · Disaster reconstruction · Housing development · Urban infrastructure · Urban morphology · Water management

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1 Introduction

December 26, 2004 remains a day of infamy for much of Asia, particularly in southeastern India where thousands perished and hundreds of thousands were displaced by a massive tsunami. Entire coastal settlements necessitated reconstruction and recovery of transportation, electricity, housing, water, and other critical infrastructure systems as the unforeseen mega-disaster set in motion the largest reconstruction project in the country's history. While much has been written on post-tsunami reconstruction [1–4], little has been written on the water components. This study examines the outcomes of water sector reconstruction for newly built permanent housing settlements in the two adjacent and similarly affected territories of Nagapattinam District and Karaikal District, India. Each territory employed the same reconstruction framework, but deployed it in different ways in practice—one more top-down and centralized using a single agency model, and one more holistic and participatory using a collaborative governance model. Contrary to theoretical expectations, the former generally produced better outcomes than the latter, begging empirical analysis as to why this was the case.

2 Setting the Stage: The Models for Reconstruction

The 2004 tsunami impacted 15 countries, resulting in the death of approximately 200,000 persons and displacement of roughly 1.7 million. After the immediate response phase, attention turned to rehousing affected populations. In India, reconstruction was not executed under the purview of preexisting central, state, or local disaster management plans or policies because no national or local disaster management agencies existed. Rather, the unexpected nature of the event, compounded by its magnitude and geographic scope, spawned a liminal process for reconstruction that was both *sui generis* and ad hoc given the policy and agency vacuum. Governments scrambled to respond to the unprecedented event by creating new departments, extending and expanding the powers of existing departments, and exercising authorities already established in various related plans that lie within the bounds of local administrative powers. State and local governments—thrusted by media attention and citizen demand for political action—sought to mollify the post-disaster situation with a multitude of fresh government orders, temporary measures (e.g., relief camps, transitional housing), and financial assistance to families that experienced a fatality. To address reconstruction and recovery, Nagapattinam District (in the state of Tamil Nadu) created the Tsunami District Implementation Unit (TDIU) while the adjacent affected territory of Karaikal District (in the Union Territory of Puducherry) created the Project Implementation Agency (PIA). Both agencies were established and appointed administrative heads to officially manage reconstruction activities in their locales.

As humanitarian need swelled, the Government of India sought financial assistance from external actors in order to reconstruct well over 100,000 damaged and destroyed homes. In Nagapattinam and Karaikal, external aid was formalized through prototypical memoranda of understandings (MoUs) drafted by the State of Tamil Nadu and Union Territory of Puducherry, respectively. The MoUs were duly signed by the District Collectors (county supervisor in the United States) and the nonprofits that had promised to construct a settlement or specified number of housing units along with associated infrastructure. Three days shy of the tsunami's one-year anniversary, the Government of India passed the "Disaster Management Act, 2005," which created the National Disaster Management Authority (akin to the Federal Emergency Management Agency in the United States), as well as state and local level disaster management agencies. The Act further permitted and explicitly encouraged the acquisition of external aid in times of disaster, stating in Section 30(xxvii) that districts should "encourage the involvement of non-governmental organisations" [5, p. 17] while being sure to "provide rehabilitation and reconstruction assistance to the victims of any disaster" [5, p. 23]. Thus, the post-tsunami reconstruction canvas—including the water sector—emanated from a lack of pre-tsunami disaster planning, creation of the MoU framework to access external assistance, and the subsequent encouragement of MoUs by the new Disaster Management Act and National Disaster Management Authority.

The MoU frameworks employed in Nagapattinam District (under G.O.Ms.No.25) and Karaikal District (under G.O.Ms.29) are virtually identical. Each MoU signified an official agreement between the district level governments and non-governmental organizations (NGOs) that all housing settlements would be jointly constructed and must include:

> [G]ood roads preferably cement roads with side drains with RWH [rain water harvesting] facility, good water supply, sanitation, schools, noon meal centers, solid waste disposal facilities, street lights etc. [6, Annexure 1].

In terms of responsibilities, each government (through the newly created TDIU or PIA) was responsible for land acquisition and preparation, hard surface roads, electrical connections, and connection to a water supply. Meanwhile, NGOs were responsible for constructing disaster-resistant concrete homes, a latrine and septic tank or leach pit for every household, and water access points. Drainage infrastructure was optional but "should also be focused upon" [6, Annexure 1] in Nagapattinam, while it was required as a government task in Karaikal—this is the only practical difference between the MoUs. However, as noted, while the MoU framework employed in each political territory was virtually identical, Nagapattinam deployed it through a collaborative governance approach while Karaikal exercised a single agency approach. This presents a natural social/policy/governance experiment in that political units with similar social, economic, cultural, climatological, and geophysical attributes experienced the same disruption and employed the same responsive framework, but deployed it through different governance models in practice. Thus, this study examines the outcomes of water sector reconstruction in adjacent *de jure* territories that were affected by the same event and subsequently enacted similar policy responses,

but in different ways. Outcomes of the diverging models are discussed and several strategies are provided to better integrate the water sector into larger urban, disaster, and ecological planning processes.

3 Study Area and Data Collection

This study investigates outcomes of post-tsunami reconstruction in the neighboring districts of Nagapattinam and Karaikal, India, through the lens of water. The study area lies at the mouth of the Cauvery River with a flat, low-lying topography that is perennially exposed to monsoon and multi-hazard risk. The coastal and deltaic region also exhibits a history rife with water supply and sanitation issues [7, 8]. Fourteen newly constructed housing settlements (randomly selected from 35) were investigated across eight field visits from 2008–2018 (Fig. 1). The permanently recon-

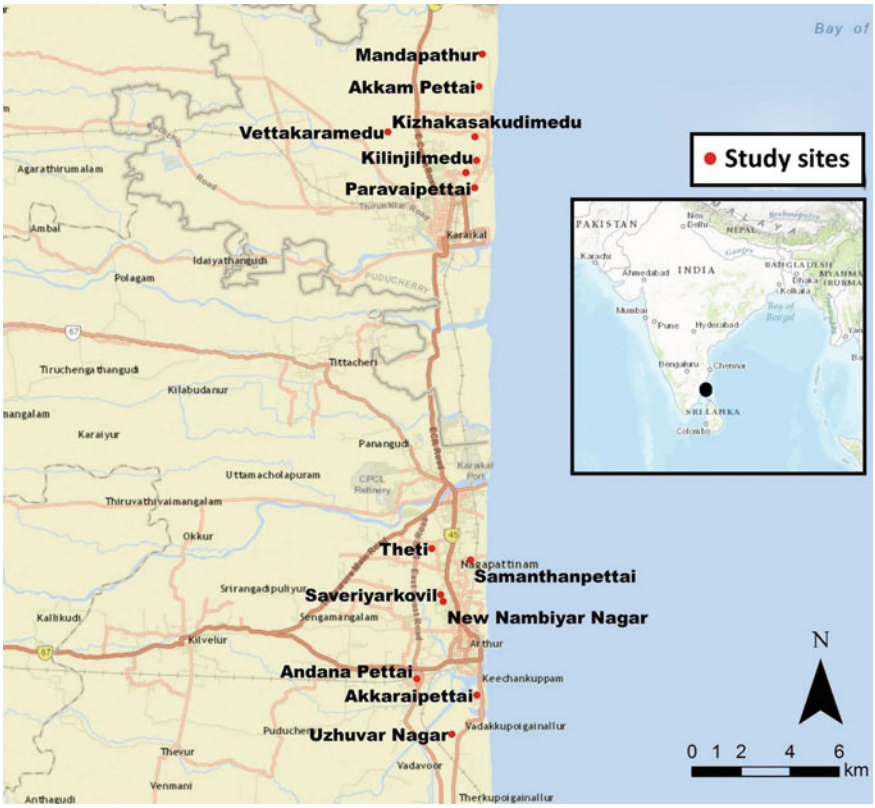

Fig. 1 The 14 study sites in Nagapattinam District, Tamil Nadu (southern set of sites), and Karaikal District, Puducherry (northern set of sites). *Source* Luke Juran's (author) photo

Fig. 2 A view of a typical study site (Andana Pettai in Nagapattinam District). *Source* Luke Juran's (author) photo

structed settlements, seven in each district, average roughly 200 households and have been inhabited since approximately 2007 (Fig. 2). The settlements are both rural and urban (demarcated by jurisdiction and governance structure) and are inclusive in terms of religion (e.g., Hindu, Muslim, Christian), livelihood (e.g., fishers, service industry, daily labor), and social location (e.g., low income, middle income, scheduled caste). Twelve settlements were relocated due to the creation of a 500 m Coastal Regulation Zone (CRZ) implemented to mitigate future hazard risk, while two were reconstructed in situ (one in each district). Each settlement was visited at least three times, and visits encompassed both the dry (May–August) and monsoon (October–December) seasons to address issues of water scarcity, monsoon seasonality, and management of and adaptations to the water infrastructure over time.

Data were acquired through a mixed methods approach comprised of 66 key informant interviews with government officials, NGOs, and individuals with specialized knowledge on water and reconstruction; 14 focus group discussions (one at each study site); and 74 semi-structured interviews with settlement residents [9, 10]. Interviews with residents were conducted as mobile interviews, which enabled interviewees to escort the interviewer to waterscape features, discuss tangible issues in real space, and 'teach' the interviewer about their lived experiences [11]. This approach also facilitated the application of observational theories while attempting to cultivate rapport by placing interviewees in command [12, 13]. Furthermore, this study

elicits insights from over one decade of fieldwork in which practice theory, extensive survey data, hundreds of water quality tests, and ongoing community conversations have permitted a longitudinal and triangulated perspective. These data, combined with emergent post-tsunami policies and primary government documents, are used to construct a critical narrative on how the same reconstruction framework was deployed differently in two similarly affected territories, effectively serving to create two different post-disaster waterscapes.

4 Deployment of the Reconstruction Models

The framework for reconstructing housing settlements, including water infrastructure, was virtually identical in Nagapattinam and Karaikal Districts. Each government formalized reconstruction activities in MoU agreements with NGOs. However, while responsibilities of governments and NGOs in each MoU were essentially the same, the governments managed those responsibilities differently: Nagapattinam through a collaborative governance approach, and Karaikal through a more centralized, single agency approach. The two models will be described in this section followed by a discussion of the outcomes produced by the models.

4.1 The Model for Reconstruction in Nagapattinam District

After surveying damage to housing settlements, the State of Tamil Nadu, in which Nagapattinam is located, enacted its first reconstruction-based directive in G.O.Ms.No.25. The government order officially established the MoU framework and collaborative governance approach for post-tsunami reconstruction in all districts of the state. The order begins by stating:

> Many non-government organisations, voluntary agencies, corporate houses, charities, public and private sector enterprises etc. have been in contact with the State Government to participate for the permanent relocation and rehabilitation of people affected by this calamity. The Government has considered these requests from such agencies and has decided to set out the framework for partnering with the State Government for permanent relocation and rehabilitation of the affected persons [6, Sect. 3].

Next, the directive details responsibilities of both the district governments throughout the state (via newly created TDIUs) and partnering NGOs. The MoU obligates Nagapattinam District to purchase or secure the land required for reconstruction activities at no cost to NGOs. Thus, the government first selected and finalized sites for housing reconstruction and paid for or transferred ownership (in cases of public land) via a newly appointed administrator housed in the Revenue Department. Next, the government carried out site preparation through the Tamil Nadu Public Works Department (TNPWD) and then TDIU presented the prepared,

developable land to NGOs to erect an agreed upon number of disaster-resistant houses in a layout comprised of:

> [A]ssociated infrastructural facilities such as Water Supply, Sanitation, Waste Water/Solid Water Management, Rain Water Harvesting facilities, other ecological features, Roads, Community Centres, School Buildings, Fish and Farm Produce Market Yards, Village Information/communication Centres, etc. in consultation with the beneficiaries especially women [6, Sect. 1].

In practice, the MoU required NGOs to construct reinforced concrete houses, shared/public water access points, sewerage infrastructure for each house (i.e., pour-flush latrine with septic tank or leach pit), rainwater harvesting systems (i.e., groundwater recharge by conveying rooftop water to the subsurface via pipes), and a community hall at each settlement. Drainage infrastructure was optional, as were facilities such as livelihood training centers, libraries, commercial stalls, *anganwadis* (government childcare and nutrition centers), and parks.

Upon completion of MoU-defined tasks by an NGO, the District Collector was charged with inspecting the settlement and, upon satisfaction, took "ownership of the building and infrastructure" with a "handing/taking over certificate in writing and signed by both the parts" [6, Sect. 14]. TDIU then oversaw the completion of remaining government requirements, specifically laying pipes to connect community standposts to a water supply, providing hard surface roads, and connecting all houses to electricity. TDIU delegated these tasks to three state-level agencies: Tamil Nadu Water Supply and Drainage Board (TWAD) was responsible for water supply, Tamil Nadu Public Works Department (TNPWD) was in charge of roads, and Tamil Nadu Electricity Board (TNEB) was accountable for electrical connections. Upon completion of these tasks, the settlement was deemed complete. Each tsunami-affected community was settled *en masse* into the newly created settlements with houses allotted to families via a lottery to ensure fairness.

Additionally, given the chaos that surrounded the tsunami and the fact that thousands were living in transitional shelters awaiting permanent housing, the government arranged weekly Shelter Advisory Committee (SAC) meetings. The meetings were open to the public (i.e., housing beneficiaries) and aimed to communicate emerging information and up-to-date construction timelines for each settlement. Furthermore, questions were answered, suggestions were fielded, and the government sought to build a level of rapport through a process that was arguably participatory and transparent. SAC meetings were attended by the District Collector, officials from TDIU and relevant government departments, and representatives from NGOs involved in reconstruction.

The model for managing reconstruction in Nagapattinam District can be defined as one that utilized a collaborative governance approach [14, 15]. Although reconstruction activities operated under the auspices of a newly created, standalone agency for dealing with a specific disaster (i.e., TDIU), various agencies such as the Revenue Department, TWAD, TNPWD, and TNEB worked together and were each accountable for separate aspects of reconstruction. This collaborative and arguably holistic, participatory, and transparent model (given weekly SAC meetings) contrasts with that employed in Karaikal District.

4.2 The Model for Reconstruction in Karaikal District

The reconstruction framework in Karaikal District is essentially a mirror image of that utilized in Nagapattinam District. However, the model used to manage reconstruction in practice, including water, was notably different. First, an almost identical MoU process was conceived by the Government of Puducherry in GO.Ms.No.29 for all of its districts to follow. The MoU had the same requirements for local governments and NGOs, including a 500 m CRZ, and notes in Sect. 7 which party was responsible for various facets of reconstruction [16]. Next, the Revenue Department was renamed to Department of Revenue and Disaster Management, a name that remains to the present day, to facilitate the pass-through of government funds for land purchases. Finally, the establishment of TDIU in Nagapattinam was paralleled by creation of the Project Implementation Agency (PIA). However, PIA in Karaikal District varied from its counterpart in that it exists at the Union Territory of Puducherry level (i.e., state level) with appointed officials working directly at the district level. Thus, PIA was designated as the single agency across the territory for completing all government reconstruction tasks in the new housing settlements: water pipelines, roads, electrical infrastructure, as well as site selection and preparation. Karaikal therefore adopted a more centralized, single agency approach to reconstruction [17, 18] that deviates considerably from the collaborative approach adopted in Nagapattinam where separate departments were responsible for niche roles.

In Karaikal District, the reconstruction process began with PIA creating a Site Selection Committee. An executive at the Revenue and Disaster Management Department described the process:

> A Site Selection Committee was formed made up of nine officials: District Collector as the Committee Chairman, Deputy Collector, Commissioner of Karaikal Municipality, Executive Engineer of PWD [Public Works Department], Irrigation and Public Health section of PWD, Building and Roads section of PWD, Executive Engineer of the Electricity Board, Medical Superintendent, and a Commune *Panchayat* representative [government representative from a rural section of the district]. First, the Site Selection Committee would visit unoccupied land to see if it was suitable for development. All members of the Committee had to approve the land based on their own relevant background. If all found it suitable, then the Revenue Department would transfer the land if it was government-owned land, or approach the owners—usually individuals or temples—to purchase the land. Then it was ready for preparation and landfill [infill] [19].

It must be noted here that Karaikal's approach for site selection was more comprehensive than that of Nagapattinam, where an appointed official in the Revenue Department selected reconstruction sites.

Once sites were prepped by PIA, NGOs took over and fulfilled their requirements in a manner akin to those in Nagapattinam. When NGOs completed their work, an inspection was conducted by PIA and, upon a satisfactory review, NGOs transferred ownership of all infrastructure to the government and their duties were complete. Next, PIA—as a single entity—implemented a water supply connection, drainage channels along roadsides, hard surface roads, and electrical connections to all houses. Following the introduction of this critical infrastructure, the reconstruction process

for a settlement was complete and houses were allotted to families via a lottery as was done in Nagapattinam.

5 Results and Discussion: A Deconstruction of the Reconstruction Models

Having outlined the MoU framework for reconstruction after the 2004 tsunami and the models deployed to manage reconstruction in Nagapattinam and Karaikal Districts, it is useful to document and contrast the actual results that ensued. Based on the literature on project management and good governance [20–23], it is reasonable to assume that disaster recovery efforts that adopt more collaborative, participatory, and transparent models produce superior outcomes compared to those that do not. However, as demonstrated by empirical research in the study area that examined post-tsunami water infrastructure management [24], the introduction of latrines [25], and comparative analyses based on water quality tests and statistical and geospatial analyses [26], this is a tenuous assumption.

These qualitative and quantitative studies reveal that the more top-down, single agency approach of Karaikal produced a relatively better waterscape considering a host of attributes. Additionally, water services were generally introduced more quickly at the study sites in Karaikal while waterlogging and monsoon floods are less of a problem due to site choice and the presence of drainage infrastructure. For example, a Water Poverty Index that surveyed 300 households from the 14 study sites established statistically significant differences between water services in Nagapattinam and Karaikal in terms of water quality, liters per capita per day, number of households supported per tap, distance to collect water, flow rate, and several related variables [27]. In fact, settlements in Karaikal outperformed those in Nagapattinam in every water comparison, where individuals in the latter secured 43.1% or 21.6 fewer liters per capita per day and 77.5% of public taps tested positive for fecal coliform [27, p. 963]. Prince et al. recently expanded the study with 10 additional reconstructed settlements in Nagapattinam and Karaikal (five in each district) and 207 more households. Similarly, comparisons of all water-related indicators were statistically significant with Karaikal outperforming in each case [26]. Furthermore, spatial analyses via Global Moran's I tests indicated that statistically significant differences between the indicators are not random but rather a determinant of spatial organization [26]. In other words, positive spatial autocorrelation exists in which similar indicator and Water Poverty Index scores cluster in space. The clusters are divided by district lines and are, at least in part, an etiology of the reconstruction processes that generated their existence.

5.1 Deconstruction Junction: How the Models Functioned

Although the adoption of a relatively collaborative and participatory approach in Nagapattinam is commendable, such efforts were hindered by the lack of a coherent vision and development strategy. The absence of vision was first exposed during site selection and carried through subsequent phases of the reconstruction process. These phases will be narrated with the goal of dissecting and ultimately learning from the intricacies of this case study to foster enhanced integration of water into reconstruction and other politico-developmental processes.

In Nagapattinam District, the first compounding issue was site choice. An appointed official at the Revenue Department was in charge of selecting and securing land for all reconstruction sites. While there was informal input from other officials and all land purchases and transfers were approved by the District Collector, sites were ultimately selected based on financial and construction ease [28]. That is, land already owned by the government and land that was cheap, flat, and easy to prepare and develop were (inadvertently) privileged in selection. As declared by an Executive Engineer at TDIU, "geography wasn't a concern because the government would prepare the land and it would be inspected" [29], suggesting that any precursory issues would be fully rectified at the site preparation stage. However, as will be demonstrated, price and physical developability do not necessarily translate into good outcomes in the water sector.

Next, upon taking over settlements from NGOs, issues arose in coordinating the remainder of government tasks. Participating agencies (i.e., TWAD for water supply, TNPWD for roads, and TNEB for electricity) were alerted by TDIU when a site was ready for public services, but the order of introducing services was not prioritized. In practice, this led to settlements being constructed haphazardly. For example, one study site with a newly introduced water supply had several major pipes broken during the subsequent introduction of roads by TNPWD. Upon the site being inhabited, residents complained that there was no water. TWAD insisted that water supply lines were installed and that they had dutifully done their job, but after several more complaints the broken pipes were finally identified and fixed. Meanwhile, TNPWD stated that they were simply doing their job by laying the roads where they needed to be. At another site the water supply was implemented after the introduction of roads. In this case, TWAD tore up sections of roads to lay pipes but failed to patch the roads or contact TNPWD to return for remedial work. The torn up sections of road were eventually filled in with pieces of broken bricks by settlement residents. Further, there were multiple cases of road construction resulting in broken septic tanks and leach pits from heavy machinery that got too close as operators failed to pay attention to or were unaware of the subsurface infrastructure. Another issue is that some sites were complete except for one remaining critical service. These sites would sometimes remain vacant for months until the service—often connection to a water supply—was finally provided. Such sites were not prioritized as agencies merely went site to site to provide their service without harnessing a coordinated and more holistic view. A final example of inefficiency and ineffectiveness emerged once

settlements were declared complete and inhabited. Here, the lack of attention paid to drainage (optional for NGOs and thus rarely introduced due to cost) portended to floods and persistent sanitation issues as standing water negatively interacted with sewerage infrastructure, degraded water quality when retrieving water from public taps, and created stagnant bodies to support mosquito habitats in a region combatting several mosquito-borne diseases (e.g., chikungunya, dengue, malaria, and zika).

In Nagapattinam District, the model for reconstruction was collaborative as well as relatively participatory and transparent through organized SAC meetings, but the approach ultimately lacked coordination. Despite operating with a spirit of openness, the agencies operated in silos, were tripped up by bureaucracy, and produced inequitable infrastructure across space through the fabrication of fragmented settlements that lacked a unified vision. A primary example of these heterogeneous outcomes can be observed in Arlikatti and Andrew's study documenting uneven housing recovery in rural Nagapattinam District, particularly among low caste communities (i.e., bottom rung of the Hindu hierarchy) and non-fisher communities who perceived that fishers were privileged in the doling of humanitarian aid [30]. Ultimately, cumbersome coordination and the absence of a shared vision served to limit the speed, scale, and scope of recovery. This also led to settlements, on average, taking longer to both build and populate in Nagapattinam compared to Karaikal. Dr. J. Radhakrishnan, District Collector of Nagapattinam at the time of the tsunami, is quite frank and humble in agreement:

> All of the water solutions were short-sighted and not visionary. The government and NGOs were rushing development in order to finish the reconstruction there was no cohesion or long-term planning. The entire reconstruction process was not given the importance it was due. It was put through strenuous approvals through various government levels, but not for reconstruction purposes, only for following rules and to do your job [31].

Thus, in practice, there was an absence of a true collaborative culture or ecosystem approach to address the intractable issues of housing, disasters, and water. Annie George of Building and Enabling the Disaster Resilience of Coastal Communities, an NGO that helped to coordinate other NGOs involved in reconstruction activities, is even more direct:

> Reconstruction results seem Helter Skelter [disorder or chaos] and not an improvement of the previous scenario. The government had funds to produce better, more well planned, and more sustainable results, but they chose not to. They intentionally got the bare minimum done and swept the rest under the rug [32].

Therefore, the great potentials for water sector reconstruction, as well as for other sectors, were subjugated by a systemic business-as-usual approach that failed to break down inflexible traditions of governance. Even Radhakrishnan readily admitted that "we need to move to a higher plane" to address future issues more holistically and collaboratively rather than "simply pushing papers for the sake of performing work" [31]. Here, the demand for development expedience without various groups/agencies having been versed in collaborative decision-making resulted in a hybridized governing arrangement that although well intentioned, may not have been fully

equipped to swiftly navigate the myriad challenges (economically, socially, politically, etc.) of a post-disaster landscape. This echoes the findings of Prater et al., who argue that Nagapattinam's initial ability to develop a vertically and horizontally integrated response plan was lacking [33].

In Karaikal District, the more top-down, centralized, and single agency approach was ultimately more coordinated and produced relatively better and cohesive outcomes. The PIA—a union territory (i.e., state) agency unlike the lower district level TDIU in Nagapattinam—began with site selection. While PIA was in charge of all reconstruction activities, it formed a comprehensive nine-person committee to consider various facets of settlement construction, including those relevant to the water sector such as PWD (water service provider), the Irrigation and Public Health section of PWD, and the Medical Superintendent. Therefore, site selection in Karaikal was founded upon unanimous approval from numerous sector-specific agencies and utility providers, thereby forcing a lens of holistic long-term settlement sustainability into the process. After site preparation overseen by PIA, NGOs completed their infrastructural tasks and handed sites back over to PIA for introduction of water supply, drainage, roads, and electricity. Here, each government task was directed by PIA including what was to be done and when and where it was to be performed. This more command-oriented process—which was less collaborative, participatory, and transparent—resulted in settlements being constructed not only with fewer bungles and bureaucratic delays, but also with more consistent and standardized infrastructure across space. Furthermore, on average, sites were completed and populated more quickly while containing relatively superior waterscape attributes (e.g., quality, quantity, and less flooding due to drainage) relative to Nagapattinam.

Compared to collaborative governance models, single agency models are often contended to be less effective in theory based on, among other things, their encumbered ability to consider the wider picture, build institutional capacity, and engage stakeholders and the broader citizenry [15, 34–36]. Likewise, top-down management is eschewed in today's activist and community-based participatory research (CBPR) as an approach that decontextualizes projects, relies on prototypical and/or technocratic 'solutions,' and further marginalizes subaltern populations [37–39]. However, in the case of Nagapattinam and Karaikal, the top-down, single agency model spawned relatively better results in practice. This outcome begs several rhetorical questions: how does this inform conventional notions of 'good' governance, what does this challenge in a theoretical and practical sense, and—more broadly—how does one make sense of the outcome as a simultaneous advocate for both communities and effective process?

First, we argue that findings of this study should not be instrumentalized as convenient rationale to institute exclusive and non-participatory governance as there is value in harnessing a comprehensive view, promoting transparency, and establishing a robust trust ecology among stakeholders and citizens. However, this must be accomplished not only in theory and on paper, *but in practice*. Next, and as argued by Sørenson and Torfing, much deliberation occurs during the 'upstream' design of collaborative approaches in terms of representation and agreeing upon

tasks [40]. However, many problems to be confronted are located 'downstream,' thus warranting additional time to be spent on examining the impacts of upstream decisions and jointly agreed solutions upon actual outcomes.

A pragmatic consideration of three approaches developed by water and disaster scholars may better integrate the water sector into reconstruction processes in the study area and writ large. Camron and Shamir's Water-Sensitive Planning (WSP) approach to sustainable development integrates the water sector into larger urban and regional planning based on an overarching principle of 'multiple goals and common means' [41]. Important regarding the case of Nagapattinam and Karaikal, the WSP approach calls for interdisciplinarity in planning and acknowledges various planning scales all the way from the building site to the entire catchment area. These principles may have assisted in fashioning a more holistic process with more consistent outcomes across the projects. Juran's Water Resources Reconstruction (WRR) framework, borne from several longitudinal studies on post-tsunami reconstruction in Nagapattinam and Karaikal, provides additional guiding principles to integrate water into the reconstruction arena [28]. In this case, the WRR framework's principles on designing an effective organizational structure, managing scalar issues of governance and land-use change, and integrating water as a dual component of both disaster recovery and long-term sustainable development may have served to enhance project management, improve coordination among agencies, and avert future water problems that arose due to upstream decision making. Finally, Kreamer's ten allegories on how humanitarian water development can actually injure communities may have proven valuable to reconstruction actors as collaborative governance in Nagapattinam appears to have suffered from a synthesis of not seeing the big picture (Antonie van Leeuwenhoek View), nearsightedness and poor long-term planning (Mr. Magoo Myopia), and doing the bare minimum (Neville Chamberlain Approach) [42].

6 Limitations and Critical Considerations

It would be remiss to omit several limitations in our comparison of water sector reconstruction in Nagapattinam and Karaikal. First, it must be stated that the districts—while extremely similar in culture, livelihood, climate, physical geography, and disaster affectedness—exhibit notable differences. For example, Karaikal had a smaller population, more (internal) green space available for reconstruction, and fewer settlements to reconstruct as a function of its shorter coastline. Conversely, Nagapattinam had a larger population and less land available for reconstruction given its narrow shape and elongated coastline. In fact, Radhakrishnan posits that, second only to magnitude of the event, "the linearity of the district was the biggest obstacle" [31]. He continues:

> Land was at a premium because much of the district was destroyed due to its geographic linearity. There was not enough space to put up such a large concentration of new houses, especially with the CRZ [500 m coastal buffer] regulations [31].

A second limitation stems from the fact that newly created government agencies were charged with overseeing reconstruction activities in an extremely raw and chaotic post-disaster setting. Such an approach has been shown to exhibit delays and jurisdictional confusion [43]. Further, the disaster was both unprecedented and unforeseen; as stated by Murugesan, "it was the first time we had such a big problem" [19]. In fact, the 2004 tsunami ranks as the largest single reconstruction effort in India's history to date. Thus, one wonders, as somewhat postulated by Jordan et al. [44], if the collaborative model may have worked better at a smaller scale and/or under a more flexible timeline that did not entail external actors, media attention, and mass homelessness.

Yet another limitation relates to the inability to refute claims that outcomes could have been worse in Nagapattinam had a collaborative governance model not been deployed. That is, albeit with flaws, perhaps the collaborative and relatively participatory model produced better results than otherwise would have been attained. For example, SAC meetings did at the very least offer an opportunity for citizen engagement, even if the opportunity or its impact were not particularly robust. Further, Lawther has claimed that as the scale of disaster increases, so does the difficulty in implementing popular input as a foundation of reconstruction [45]. This has led some to argue that while community participation can take on a number of forms and be implemented at various stages, there is no single theoretical model for participation that automatically affords better results, specifically noting that reconstruction models without popular input can also be successful [46–48]. Rather, as contended by Lizarralde and Massyn, the organizational structure—not inclusion of the affected community per se—is often the biggest indicator of project success [47]. Finally, it would be misleading to assume that Karaikal's single agency model operated without flaw or that it represents a beacon to strive for. Rather, similar problems also surfaced in Karaikal regarding water sector reconstruction and management of the newly introduced infrastructure [see 24, 28]. However, the frequency, magnitude, and community impact of such issues were markedly less when comparing the two territories.

Ultimately, we concur with Mulligan and Nadarajah that "there is a need for good physical and social planning in the development of new permanent settlements" [49, p. 362], and this work highlights ramifications of this ongoing disconnect between local communities, government agencies, NGOs and other stakeholders in the arena of disaster reconstruction. Given that organization and orchestration of the development community unfolds differently in different locations, it remains important to highlight how various locations mobilize following a disaster and to learn from such processes.

7 Conclusion

This study critiqued post-tsunami water sector reconstruction in the adjacent and similarly affected districts of Nagapattinam and Karaikal. While the political territories employed virtually identical frameworks consisting of MoUs with humanitarian organizations, the practical model each government deployed to manage reconstruction activities diverged. Contrary to governance theories, as well as practical approaches rooted in activist and community-based participatory research, outcomes generated under the relatively top-down and centralized single agency model produced better outcomes. Moving forward, this result warrants a serious theoretical and pragmatic discourse. The discourse should not focus on discrediting, dismantling, or prescribing a specific approach, but rather on how to produce optimal short- and long-term results given multiple constraints (e.g., geographic, temporal, resources) and often competing objectives. As evidenced in the cases of Nagapattinam and Karaikal, this dialogue is particularly significant for the water sector because water not only sustains the residential, commercial, and industrial sectors, but also represents a crucial component of urban planning, disaster management, and long-term human and ecological development.

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