Co-Production or Contested Production? Complex Arrangements of Actors, Infrastructure, and Practices in Everyday Water Provisioning in a Small Town in India

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**Abstract**

This paper critically analyses complex arrangements of actors, infrastructure technologies and practices to argue that co-production of urban service delivery entails a mutual, but contested dependence of state and non-state actors. We present two empirical cases based on in-depth qualitative fieldwork highlighting the role of Councillors regulating formal hydraulics and the fragile, volatile relations of private water provisioning in Baruipur Municipality, a small, peripheral town in the Kolkata Metropolitan Area. Characterised by groundwater arsenic, iron risks and heterogeneous urban waterscape, our analysis shows that powerful socio-political intermediaries shape everyday provisioning and access, ‘re-politicisation’ complicating notions of collaborative alliances, equitable benefits and sustainable, material improvements. While gaps in piped water provisioning in the global South cities do find nascent community-led, collective service delivery efforts, in a socio-political context where water is understood as a public right, a state provision, does the continued reliance on the state allow joint service delivery to manifest?

**Introduction**

We must increase trustworthiness in the state-led provisioning system because there seems to be little faith. True, there are inadequacies and deficiencies. People perhaps do not have faith in the system. But private vendors deliver in a way that is particularly bad! […] Co-production can be scattered/sporadic; it can definitely be demonstrative, but can never be full-fledged. It may be community-based but cannot be a total solution for the country [Interview with a retired public health official, May 2018, Kolkata].

The above quote reveals the multiple state and non-state actors that are involved in water provisioning in urban areas and the deep distrust that public officials feel towards private water vendors. The official’s words also indicate the ambivalent attitude of the state towards the possibility of collaborative and co-produced water service delivery. Central to these disputes is the understanding of technological systems as being both embedded in and capable of challenging established power structures in society. Drawing on the idea of infrastructure as socio-technical systems (Coutard and Rutherford 2016), we critically examine the concept of co-production in the context of water supply in Baruipur Municipality,\textsuperscript{1} a small but rapidly urbanising town located within the Kolkata Metropolitan Area (KMA).\textsuperscript{2} Drinking water supply is through a state-driven, piped treated surface water network that is partial and limited in its reach. This system co-exists with public and private forms of non-networked or discrete infrastructure arrangements such as shallow and deep tube wells that rely on groundwater sources. However, the presence of deadly groundwater arsenic has prompted
the state government to continually expand the supply of treated surface water through piped water networks across the town in a phased manner while attempting to reduce the reliance on groundwater.\textsuperscript{3} Locals though continue to depend upon discrete groundwater sources for drinking purposes leading to multiple contestations. The actual on-ground access to water is mediated by multiple, complex, yet tenuous arrangements between state and non-state actors.

The dominant idea behind co-production is the changing state-society relationship wherein essential municipal services like water, sanitation and drainage are jointly delivered through the involvement of non-state (individually or collectively) and state actors (Mitlin \textit{et al.} 2018; Mitlin and Bartlett 2018). In the case of cities in the global South, given significant exclusions and gaps in urban service delivery, these non-state actors are the informal community-based organisations of low-income settlements, residents welfare associations, or non-governmental organisations (Allen \textit{et al.} 2017; Mitlin and Bartlett 2018; Moretto \textit{et al.} 2018). The paradigm shift around urban service delivery involves decentralisation and substantial citizen engagement in these service delivery processes. Scholars contend that greater participation in co-produced services ensures political inclusion, empowerment, equal access and benefits (Mitlin and Bartlett 2018). Service providers and the recipients of the service are both equally engaged in the processes and mechanisms of delivery through a harmonious, participatory and equity-laden co-operative alliance between state and non-state actors (Ostrom 1996).

We take a closer look at the diverse arrangement of actors, infrastructure technologies, and practices in accessing urban water in Baruipur based on which we suggest three points to deliberate upon the concept of co-production in urban service delivery. First, there are intermediaries involved in the co-production of services. Second, co-production does not always allude to co-operative, state-citizen alliances that involve an equal engagement by participants. Rather, existing power differentials and uneven access to services mediate and shape the interaction between actors. Considerable friction, competition and conflict characterise co-production. Third, in cases where the state is weak, other non-state actors step in to bridge the gap. Still, their involvement is likely to reiterate some of the existing socio-spatial inequality rather than enhance inclusion. While the involvement of multiple actors indicates co-production, we argue that urban service delivery is emerging out of a mutual need, but resulting in a contested dependence between state and non-state actors. Therefore, these interactions do not necessarily lead to equitable benefits or material improvements in services, and the outcomes are likely to perpetuate socio-spatial inequalities.

Our case study contributes to research that shows how diverse practices of water access demonstrate a multiplicity of forms, hybrid and tenuous arrangements that are localised and decentralised (Monstadt and Schramm 2015) leading to differentiated outcomes. The examples help to expand the notion of co-production as an arrangement of disparate actors with unequal power relations who are using technological systems to ‘rework’ (Coutard and Rutherford 2016, p. 21) resource distribution and its access.

In this article, we analyse two specific types of socio-technical configurations of water provisioning in Baruipur town. Through these, we attempt to understand the complex political articulations between public, private and community actors in producing, extending, and maintaining these services. The analysis is based on in-depth qualitative fieldwork in Baruipur from December 2016 to August 2018, during which we interviewed metropolitan development authorities, public health officials, Municipal Councillors, water department engineers, residents and private water vendors. Water infrastructure is a methodological entry point to study actor coalitions around the different socio-technical arrangements that form to counter the gaps, inadequacies, shortages and inequalities in the water supply. In both cases, we try to reveal the shifting power dynamics and social equations, to analyse mechanisms of differential access and what factors drive a diverse set of actors to ‘co-produce’ services. While the standpost case highlights the relationship between public actors and people’s collectives, the case of packaged drinking water deals with private water vendors with limited public participation. We argue that existing socio-political dynamics influence the degree of accessibility to water and engagement in co-producing access. The outcomes, therefore, are inequitably spread across the different stakeholders engaged in the process.

In the next section, we discuss the key debates and ideas around the concept of co-production and indicate how we use it in our work.
Review of literature

While some scholars find the term co-production of services to be conceptually fuzzy, several authors contend it is still evolving and can be approached through multiple entry points (Moretto and Ranzato 2017). Ostrom (1996, p. 1073), defines it as ‘the process through which inputs used to produce a good or service are contributed by individuals who are not “in” the same organisation.’ The term ‘institutionalised co-production’ (Joshi and Moore 2004, p. 32) refers to organisational arrangements that involve state agencies on the one hand and organised collective of citizens on the other that leads to an efficient, regular and sustained service delivery. Moretto et al. (2018) list two main features (i) an original solution among the range of available institutional arrangements that public sector organisations may use to fulfil their purpose and (ii) active involvement of citizens in the production of goods and services. Bovaird (2007) has challenged this idea of stressing the role of state agencies in co-production.

While typically co-production has been projected as a co-operative practice, Ahlers et al. (2014, p. 2) have argued that co-production is far from being collaborative. Instead, it is ‘riddled with power asymmetries and political aspirations’ thus producing uneven and highly contested service provisioning. We use the term ‘co-production’ to mean the involvement of different kinds of user groups (individual and collective, private and community-based) alongside the public sector actors in the production of urban water supply services in Baruipur.

Benefits and limitations of co-production of urban services

Mitlin (2008) has summarised the benefits of a co-production strategy based on design, inclusivity, political gains, empowerment and poverty reduction. Drawing from citizens’ action and grassroots social movements, Mitlin says co-production can provide an arena to challenge particular modes of governmentality which limit access to services for low-income communities. The application of co-production could be to negotiate improvements in services and may result in the empowerment of those who are marginalised (Mitlin 2008, 2018).

However, co-production is not a ‘panacea’ or universally advantageous, and problems occur such as conflicts, incompatible incentives, unclear division of roles, free-riders, lack of ability to lobby for change (Bovaird 2007). The dilution of public accountability and blurring of boundaries between the public, private and voluntary sectors is the biggest concern in instances of co-production (ibid). The division and redistribution of power, authority and control of resources between the state and groups of citizens are ambiguous when co-production occurs (Joshi and Moore 2004). These processes are highly political, opaque and call into question the lack of clear lines of accountability, democratic representation and means of public participation (Bovaird 2007 citing Baicocchi 2003).

Drivers and characteristics

According to Ostrom (1996), there are specific conditions which heighten the probability of co-producing services. The dominant conceptualisation of co-produced services is that they are self-organised. However, it is not promoted by the state, and neither is the process driven by the motive of income generation (Mitlin 2008). Joshi and Moore (2004) indicate two ‘drivers’ for co-production in the global South – (i) government failure to provide adequate public services, and (ii) relates to cases where the local political-economic context makes service provisioning particularly difficult.

In the global South, co-production indicates the growing presence of intermediaries, i.e. actors who perform the role of both producers and negotiators (Moretto et al. 2018). Co-production contexts are complex and dynamic – the process not limited to bilateral relationships. Given conflicting stakeholder values, differential power can make co-production outcomes unpredictable and often socially undesirable; although they do ‘extend the opportunity space of available solutions for social problems’ (Bovaird 2007, p. 857). Systems as these, exhibit interdependence of decision-making that reflects significant influence exercised by all actors and outcomes that no one powerful actor dominates.

In reality, asymmetrical relations of power among actors drive and influence decision-making. We argue that actors develop a tacit and shared understanding of how these power differentials influence the working and access to the water supply. The outcomes produced are thus, uneven, which reinforces inequalities and at times, may even create new faultlines of
socio-spatial inequality. We use the concept of water infrastructure as socio-technical systems (Jaglin 2014; Coutard and Rutherford 2016) to look at Baruipur’s complex and heterogeneous water arrangements. We aim to study the socio-political outcomes of disparate actors using varying technologies of infrastructure and governance strategies to shape drinking water delivery in the urban. Water is a contested socio-technical terrain (Bakker 2012) given that different social groups and institutions of varying levels of influence and power try to establish control over one another by controlling the access over water. Moretto et al. (2018) emphasise a holistic view by considering the institutional, resources and urban aspects of co-production.

This paper attempts to highlight the presence of multiple non-state actors involved in creating dynamic configurations of actors in everyday water service delivery. While some may be ‘self-organised’ by townspeople, other configurations require the tacit support of local-level political representatives that imbue these socio-technical arrangements with particular forms of politics and power play.

We argue that co-production does not necessarily lead to an improvement in services. The state of West Bengal continues to be the primary provider of essential urban services, and successive political parties in power have treated water as a ‘basic service’ or a public good. Hence, it is significant to understand the co-production of water in this broader political-economic context of urban service delivery where there is a continued reliance on the state.

Moretto et al. (2018) state that perspectives on co-production in recent urban scholarship view it as a ‘specific arrangement, a fair and sensible alternative to the modern infrastructure ideal’ (p.426). Looking beyond networked infrastructure technologies, Jaglin (2014) suggests the focus should be on delivery configurations. Ahlers et al. (2014) have remarked that the co-production concept reveals multiple actors who interact through a dynamic set of social and material relations to access, provide and control the system. These interactions unfold and operate at various scales, mediated by technology. The resulting service provision configuration is a product of highly political negotiations shaped by unequal powers and in turn, produces differentiated citizenship. Sometimes, citizens engage in the core area of the state’s public service provisioning in the absence of the state’s ability to reach marginalised populations.

Therefore, co-production may not necessarily lead to more socially inclusive, participatory and just cities. Instead, it may be the site for the consolidation of power and accumulation of capital for one group over the other.

In the next section, we describe the particular socio-technical systems of water supply that co-exist in Baruipur’s heterogeneous waterscape.

**Networked and ‘off-network’ water supply systems in Baruipur**

We describe Baruipur’s multiple and diverse water supply technologies that range from networked to discrete sources. Treated surface water feeds the piped network, while the shallow and deep tube wells, as well as packaged drinking water units, use groundwater sources. Here we examine the material dimensions and constraints, before engaging with the specific socio-technical systems to show how different actors negotiate, regulate and manage access to water in practice.

Several authors have written about the social, technical and socio-technical dimensions of networked infrastructure in the global South cities (Anand 2011; Björkman 2015; Tiwale et al. 2018; Schindler et al. 2019). They have highlighted the intricate mesh and unevenness of networked services. Baruipur’s centralised piped water system is an intricate technical configuration of pipes, public standposts, mechanised pumps and, manually-operated valves, reservoirs and water tanks. Calculations of per-day availability, pressure, network availability, timings, electricity supply, and a range of other elements measure water flow and distribution.

In the 1970s the Municipality built a localised piped distribution network that channelised groundwater. A system of motorised submersible pumps, pipes and manually-operated water valves controlled the groundwater flows. Water was accessed from public standposts. However, this network was initially limited to a few wards located in the core, densely populated wards in the northern part of the town. It was expanded incrementally to other wards on an ad hoc basis. Piped water coverage and access have always been unequal across the city.

In 2003, Baruipur got connected to the centralised, state-operated, water treatment plant which filters and treats raw water from the Hooghly River in response to the arsenic scare. The bulk mains carry
this treated surface water to an underground reservoir at the booster pumping station. Here, three motors thrust up the water to five elevated service reservoirs (ESRs), for storage and distribution at fixed supply hours thrice a day. The municipal water department performs, what Björkman (2015, p. 31) calls a ‘stunningly elaborate choreography’ to produce tap water. The ESRs direct water flows down and through different diameter pipes for distribution in the wards via street standposts, and individual house connections. In contrast to the exclusive and private access provided by house connections, standposts are public and act as visible nodes in this piped water network.

In addition, Baruipur’s citizens depend on several low technology, hand-pump operated, tube wells that lift untreated groundwater. These ‘off-network’ (de Bercegol 2017, p. 172), manually-operated infrastructure are point sources, providing a localised alternative to the piped water network operations. Tube wells are accessible as ‘shallow hathkol’ (<150 m depth) and deep (’1000-foot’ drawing water from deep aquifers, >150 m). The 1000-foot is a public municipal drinking water source as it requires a deeper borehole drilling which is an expensive investment and needs to be located on publicly accessible land. On the other hand, shallow tube wells are found in individual households as private resources. Many residents (including middle-class families) who do not have a municipal household connection have affixed small mechanised pumps to their shallow tube wells and set up a tank for storage.

Given the arsenic contamination in the entire district, the state government and the Municipality has been expanding the pipe network so that more people can access treated surface water. In order to ensure a steady flow across this network, the Municipal water department proposes to seal off the existing public standposts in neighbourhoods with adequate house service connection coverage. However, for low-income households, these standposts are important water collection points. Accessing water from these public sources is a daunting task and requires waiting and negotiating the daily disputes between people in the queue.

The geography of access to household connections is uneven and mediated through socio-spatial forms of inclusions and exclusions. The Municipality charges a one-time connection fee (no monthly user charges levied). In order to avail the household connection, a valid property tax receipt is required – thus excluding poorer households and those housed in informal settlements. Middle-class households living in the formal settlements on the town’s peripheral reaches are also excluded from the piped network because it is expensive to extend pipes in areas with scarce populations. In such cases, the ‘off-network’ hand-pumped shallow tube wells provide direct, free and flexible access to groundwater available at all times to households at least for ‘rough use’ (non-drinking purposes). Across the class divide, and whether households live in formal or informal settlements, they do access water from their nearest deep tube wells for drinking purposes. These wells are often ill-managed and suffer frequent breakdowns that require the Municipality to repair them.

Townspeople perceive the treated piped water as unfit for consumption purposes because of its muddy, brackish quality and smell. Moreover, Municipal piped supply is irregular, intermittent, and varies in quantity, and therefore requires stringent social regulation of standposts. Residents implicitly trust the deep tube well and mineral water for drinking purposes. They use piped water and shallow tube wells for all other household purposes.

Despite the multiplicity of drinking water infrastructure, irregularity of water flows (in terms of quantity and quality) and a fragmented, exclusionary network characterises the heterogeneous waterscape. Everyday water access requires specific socio-political skills and a need for different kinds of governance arrangements for regulating water sources. This uneven situation around water access sets the background for different configurations of ‘co-production’ mechanisms to emerge.

In the next section, we follow two different socio-technical water arrangements from Baruipur to unravel the complexities in the character of ‘co-produced’ services. We examine how neighbourhood socio-political relations mediate and shape everyday water provisioning. In the first case, we study public standposts as part of the piped network services. We find informal community groups and elected Councillors play important roles in governing and regulating the water flows and access to the standpost itself. However, pre-existing relations of patronage and political proximity complicate these practices on the ground. In our second case, we talk about enterprising residents who have become private water vendors.
using non-networked infrastructure systems to run a parallel business of packaged mineral water. Here the vendors are not the only ones who produce water privately. Our study hints at the tacit local-level political and community support and the fragile, volatile business relations that shape this service delivery configuration.

**Case Studies of water supply co-production in Baruipur**

**Councillors, neighbourhood clubs and the piped water network system: patronage networks and re-politicisation of water supply**

The centralised, public sector designed and operated, large-scale, mechanised, piped water network seemingly lacks spaces or opportunities for the involvement or engagement of citizens or actors beyond the government. In a significant departure from the norm, decentralisation and urban sector reforms in the ‘90s led to the devolution of repair and operations work of infrastructure to local governments. However, the very gaps and unevenness of the piped networks have led to the emergence of a complex configuration of local-level informal and formal actors who facilitate and ensure services and accessibility. Of particular importance to our study is the role of the ward Councillor or the locally elected representative.

We contend that the Councillor plays a vital role in bridging the systemic gaps by acting as an intermediary between the Municipality and the residents, thus localising the centrally designed piped water network. The Municipal water department claims that Councillors are critical decision-makers – directing pipe layouts to provide water to their electorate, deciding where and when to turn on the water pressure by controlling the valve operators, tweaking supply timings, setting and collecting connection charges. Elected leaders also control the distribution of application forms for household connections; they give out initial approvals for connections and choose where to locate submersible pumps and hand-pumped deep tube wells.

In a particularly illuminating instance of the power of Councillors to reshape the centralised piped water network at the local level is the role the Board of Councillors has played in ensuring a more regular supply of water through the network. Together with Municipal water department engineers, the Board of Councillors has produced a hybrid, locally managed networked system, characterised by ‘mixed’ water flows consisting of ground and surface water. In a situation where municipal supply is inadequate and erratic, this local innovation has played an important role in determining how the water flows through the town’s distribution network. Mechanised pumps extract groundwater and add it to the treated surface water to ensure an adequate and continuous supply. The ‘mixed’ water reaches residents via standposts and house connections, raising critical questions on water quality. Nevertheless, the quantity of water is somewhat stabilised and improved by tweaking the centralised network.

Additionally, Councillors have also been known to push for the installation of an increasing number of hand-pumped deep tube wells, apprehending inequitable distribution of household connections in particular neighbourhoods, and countering the erratic water flows. This strategic move of going against the grain of technical advice can be interpreted as a tacit acknowledgement of established habits and customs of the townsfolk who prefer the taste of deep tube well water over piped surface water. Moreover, Councillors, when pressed by their constituencies, have refused to remove standposts from specific neighbourhoods overthrowing the advice of the technical department in sealing this infrastructure.

How do other local institutions and actors perceive these actions by the Councillors? The water department perceives such ‘substitute’ or ‘make-do’ arrangements as a ‘political strategy’ – to enhance their impact factor through improvements to the physical infrastructure. These improvisations are seen as a means to secure electoral gains often at the cost of the long-term sustainability of the system itself. Baruipur’s elected representatives regulate the formal hydraulics often on the tacit assumption of electoral support from residents. They liaise in a sustained manner between residents and the municipal administration (de Bercegol 2017; Kadfak 2019), especially given the inadequate and irregular supply of water over time and space. Councillors use their ‘discretionary power’ (Anand 2011) to determine pipework extensions, control spatial arrangements of water infrastructure and closure of particular systems, e.g. standpost installations and removals, household water connection approvals. These processes are fraught and fiercely contested, indicating how local leaders see water supply as an important arena for exerting power, influence and control [Fieldnotes, 03.06.2016]. Mechanisms employed by Councillors can either exacerbate or lessen socio-spatial inequality around water access.
Besides Councillors, other local actors and social institutions viz. party workers and neighbourhood youth clubs also function as intermediaries in the everyday governance of basic services and water access. One ward Councillor shared,

There are clubs here [...] They collaborate; they are always there when it is about neighbourhood development. Problem meaning, suppose a pipeline route needs working out, or maybe personal space is required [for 1000-foot or public standpost installation] then the Councillors require the influence of the club or say when the relationship with the neighbour next door is not good [...] it could be club negotiates the assistance of this kind [...] [Interview, 10.06.2018].

While such ground-level institutions may have been useful to counter the political weight of the Councillor and ensure equitable distribution through their vocal demands and participation, in reality, they are mostly an extension of the influence and power the Councillors wield over the local areas. This is one of the peculiar features of the nature of local politics in West Bengal, where aspiring leaders often emerge from within these social and locally embedded institutions such as the neighbourhood youth clubs (see Cornea et al. 2016; Cornea 2019). Local party workers often drawn from these clubs observe and report to the Councillor about neighbourhood issues. In this context, party workers have aided Municipal engineers to undertake surveys to ascertain gaps in the pipeline network and map household connections. Party workers also help the elderly, the poor, and other vulnerable residents in approaching the Councillor or else negotiate the opaque maze within the water department when they require, for instance, repairs, new connections. Neighbourhood clubs and party workers ensure the regulation of public standposts – they prevent fights erupting between users, and address residents’ complaints about wastage or leakage. They act as a safety valve mechanism by resolving conflicts and disputes around standpost water-use.

The Councillor’s role in mediating water access by straddling the ‘boundaries of the (in)formal and (il)legal’ enables them to re-inscribe their power (Anand 2011) within the town’s fraught local politics. This challenges the dominant notions of co-production distinguished by equal participation, reciprocity and shared action. Councillors’ negotiations with the state and the residents, in recalibrating needs, fixing quantities of water that residents can access from a particular public tap – also can heighten the inequalities of socio-political power. Moreover, it points to the lack of equal participation by all players within the co-production arrangement. While residents bring their demands to Councillors, the latter decides on the precise nature of citizen involvement and inclusion in local projects or service provisioning. In turn, the neighbourhood club members help to garner electoral support for the Councillor. There is, as a Municipal water department official indicated, ‘a lack of transparency’ in this sort of engagement; a system of patronage and ‘party politics’ guides Councillor-resident relations, which inhibits the development of more equitable local infrastructure works [Fieldnotes, 04.09.2017]. Therefore, this case study questions the assumption that the complex socio-technical arrangements between multiple actors around water supply ensure that all actors are participating in it equally and with a collaborative attitude.

Informal water vendors: co-produced service delivery for private profits?

Private vendor networks who supply water through informal mechanisms are widespread in several cities within the global South (Kjellén and McGranahan 2006; Ranganathan 2014). In Baruipur, private vendors ensure drinking water access within informal and formal settlements through drums, given that the town’s public water provisioning is irregular, inadequate, and unequally distributed. These are expensive, but dependable options and often the only solution for informal settlements that do not have accessible public water connections. It involves an unequal, economic and transactional relationship between the seller and consumer. However, given that other powerful political actors within slums draw upon their ability to extend public services in these settlements in exchange of votes, private water vendors are thus seen to play an important role in the local politics that go beyond a merely transactional approach by fulfilling the role of intermediaries.

Intermediaries bypass the Municipal water network by developing a system of water provision parallel to the state-led one. This specific arrangement creates opportunities for new players to emerge in the provision of essential urban services, challenging the unspoken relationship between that of the local government as a public service provider and the citizen as a passive recipient of a free public good.
Private water vendors sell packaged drinking water bottled from underground sources. The water is sold as mineral water – advertised as ‘fresh’, ‘pure’ ‘Arsenic-free’ alternative to the Municipal piped supply. A well-knit system of local distributors, often drawn from the neighbourhood youth, ensures residents get the amount they want to be delivered to their door-step. Unlike the first example, community members are not actively involved or visible in this system except as buyers. Neither does the state, or state actors appear involved in this market-based mechanism to meet everyday water needs (Allen et al. 2017). We argue that a mutual, yet contested dependence between disparate local actors – the Councillors and their party men, water vendors and the residents shapes this business. Together, these actors form heterogeneous, tenuous and complex networks that are inherently power-laden and unstable, mediated by social relations, face-to-face ties and territories established through notions of trust and carefully policed sense of neighbourhoods.

Mineral water plant owners set up small units, mostly in their courtyard on the town outskirts, to save capital costs on land.\(^4\) The local government is in charge of giving a commercial vending licence to these operators for selling bottled drinking water. This particular co-production arrangement emerges out of the residents’ unmet demand for safe drinking water. The underlying drivers include the incomplete coverage of municipal piped drinking water, its poor quality, and inaccessible alternatives such as deep tube wells which are frequently out of order due to lack of maintenance. Baruipur’s mineral water market started about five years ago and has grown in the last two to three years despite large-scale projects to extend the piped network carrying treated surface water to the town. Small-scale bottled water manufacturers are networked with water jar dealers, distributors and customers across socio-economic strata. Business grows via word of mouth. Vendors say there are about nine ‘companies’ in the town but claim that none of these is strictly illegal. With trade licences to operate their units, owners claim to provide water that is ‘100% purified with added mineral.’ However, there are allegations that some plants blatantly flout the operating norms and instead extract precious groundwater, thus depleting the water table with serious consequences for the town.

Micro-level socio-political relations influence various aspects of this service delivery. The mineral water business spreads mainly through referrals. It thrives on an informal system of contacts, borne out of familiarity and trust through established social relations in the neighbourhood where these entrepreneurs live. Most plant owners have offered distributorship to trustworthy contacts, mainly the neighbourhood boys to increase customers. Loyalty

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Photo 1. A private water vendor’s ‘unit’ in Duttapara, a middle-class neighbourhood (Ward 4, Baruipur Municipality – 2017) (Photograph taken by author).

Photo 2. Bottled water jar in use in a low-income household in Nazrul Sarani, a predominantly Muslim neighbourhood (Ward 12, Baruipur Municipality – 2017) (Photograph taken by author).
is foremost in these setups because water is a ‘sensitive’ issue, and the slightest slippage can affect health, upset the company’s goodwill and customers.

Moreover, the business is competitive, with predatory vendors and distributors. One plant owner who had initially joined the business as a distributor remarked, ‘You need someone trustworthy otherwise you cannot do this work. All those working with me are dependable. They do not indulge in manipulations’ [Interview, 05.12.2017].

Jar deliveries are not limited to neighbourhoods with absent or fragmented piped networks, nor as distributors claim, their service-delivery exclude households based on class, caste, nativity or religious backgrounds. ‘I give water to everyone as such. I mean, I have some among my clients who pull a van as a livelihood. There is also a client who is a surgical goods manufacturer. The range is vast. That is why I said there are clients of all kinds. Some are in employment, and some run their own business’ said a young jar distributor [Interview, 06.12.2017].

Households across socio-economic backgrounds buy packaged mineral water from local distributors. This characteristic sets it apart from formal in-house piped water service provisioning, which produces differential notions of citizenship (Anand 2011) and a gradation of rights and entitlement in the urban. Many households in Baruipur consider the Municipal networked and non-networked infrastructure as a ‘back-up resource’ (de Bercegol 2017, p. 173) and use mineral water for drinking purposes daily.

The town’s water vendor network is ‘self-organised’ (Mitlin 2008), driven by a profit motive. Often, business and electoral interests intersect; mediated by neighbourhood social relations to shape everyday water arrangements. Plant owners depend on the Councillors for permissions to set up a business and tacit assurances of security to carry-out everyday operations in exchange for support during election times. Political support and good relations with elected representatives determine chances of securing trade licence approvals. Ahlers et al. (2014) have said that frequent interaction with state authorities gives small-scale water providers a degree of legitimacy and public authority, and also safeguard their business interests. Running a water business can be lucrative. ‘Water mafias’ empowered by local patronage can exercise their authority to mediate, exploit and provide water delivery services to their customers and also shape electoral fortunes significantly as they connive with other local leaders and government officials (Ranganathan 2014).

In Baruipur, the vendor network of mostly unemployed youth forms an important vote-bank that Councillors do not intend to upset by disrupting business and self-employment opportunities. However, these networks are inherently power-laden and contested. As authorised political figureheads, Councillor approvals are a must for trade licences. However, there is little or no checks and balances on this system once the approval comes through. There are no spot verifications carried out to ascertain whether the packaged water is hygienic and fit for human consumption; no certification of water quality.

Party affiliates liaise between plant owners, Councillors and the trade licence department, and become a part of the ‘co-production’ process through their skill to expedite paperwork, find out the status of licences or a quick approval. These acts give them the scope to consolidate their reputation as intermediaries (Kadfak 2019) and strengthen their business and political interests. Our observations revealed that party workers and local club members might play a direct role in the water business by being owners or dealers/distributors themselves. Since elected leaders continue to be actively involved in their neighbourhood clubs, being a member often enables business presence and spread [Fieldnotes, 05.12.2017]. Such examples of implicit backing expand upon some of the reasons for co-produced drinking water delivery which rests upon commercial and political gains.

The Municipal water department does not recognise the drinking water supplied by local distributors as formal service delivery and refrain from talking about the burgeoning mineral water market. Officials from the state groundwater monitoring authority (State Water Investigation Directorate) on the other hand, are vocal about vote-bank politics that drives the business. Water extraction by private vendors is neither metered nor taxed; a reason why businesses can sell local brands at low prices. ‘All parties gain’ in this field – the vendors, RO companies who are selling machines and the political actors [Fieldnotes, 26.05.2018]. Water infrastructure reveals how diverse actors place their claims and broker deals to push forward and secure individual interests, pointing out why the adverse consequences of mushrooming businesses and their withdrawal practices get little heed.

Despite packaged drinking water demand, the business is extremely precarious and operates in
a legal grey area with no formal regulations on groundwater extraction. Hence, the small private bottling plants may bypass proper procedures for water treatment to make it safe for drinking purposes. A plant may extract about 500–1000 litres of groundwater to purify it for packaging. However, daily withdrawals may compound problems of water quality and reserves, increasing the concern in an arsenic-prone and iron risk area. If consumers detect spurious water, the government will be forced to investigate and seal these units, many of which operate under a suppliers licence and lack a manufacturing licence. Private vendor livelihoods, therefore, are precarious, necessitating constant negotiations with local socio-political power holders and, gauging the public sentiment around water vendors.

In the next section, we discuss the role and relative powers of actors, institutions that shape these different water delivery configurations and how the arrangements, in turn, influence socio-spatial relations of inclusion, exclusion, inequality and accessibility.

**Discussion**

Despite the existence of a modern piped water network in the town, we find different sources, especially non-networked arrangements which disrupt and challenge the idea of a centralised and uniform state-controlled system (Meehan 2014). Households manage their water needs by switching or supplementing access from more than one source, thereby off-setting the possibility of shortage. The heterogeneity of water infrastructure in Baripur Municipality suggests that there are situated and decentralised power nodes and networks instead of a single, uniform centralised authority that is regulating the different socio-technical arrangements. According to Mitlin (2018), not all multi-agency or multi-partner collaboration can be called co-production. Therefore, there is a need to explore the different aspects of heterogeneous arrangements, and the agency as well as interest positions of different actors. Our case studies reveal that hybrid service provisioning arrangements brought about by multiple actors, modalities and practices are not always characteristic of co-operative alliances that are built through equal partnerships based on principles of consensus, inclusion, citizen empowerment and power-sharing. Instead, driven by political and economic motives, hybrid arrangements such as the ones we describe, produce differentiated outcomes that are uneven, exclusionary and unpredictable; reflecting unequal power dynamics.

Our first case shows how Councillors intervene to regulate neighbourhood water distribution, improvising and extending the existing infrastructure to create steady, regular flows for the residents. However, they do not actively encourage a co-produced service delivery, nor does their influence assure equal access to water for all social groups.

The second case shows traits of co-production, wherein citizens act as private water vendors, but it is not a collaborative arrangement. Rather, the involvement of the state and fiercely competitive private vendors reflects a ‘co-delivery’ (Mitlin and Bartlett 2018) mode of drinking water services, where Councillors and municipal officials give out licences to vendors. The profit margins drive the latter. Therefore individual motives of consolidating political power or of increasing profits determine the nature of the alliance forged between state and non-state actors in water provisioning.

In the first example, Councillor involvement perpetuates existing socio-political and socio-spatial divides within and across neighbourhoods. It shows that service delivery is an intensely political process shaped by neighbourhood patronage relationships. Power differentials between elected leaders and citizens show how Councillors exercise their power to carry out infrastructure decisions. Installing new public standposts, lobby for piped network expansion, approving household connection requests allows them to reassert their political influence and weight at the neighbourhood, ward and city-level. The unevenness and the gaps in the existing fragmented network allow for the Councillors to ‘re-politicise’ (Moretto and Ranzato 2017) and exercise authority over the water supply systems. In the second example, though Councillors remain invisible in the everyday workings of private water vending businesses, they are nonetheless powerful political actors due to their influence and control over licencing and permissions that enable vendor operations. Since this business opens up lucrative employment opportunities for the neighbourhood youth, Councillors can command respect and secure their positions as local leaders.

Our study points out the emerging role of intermediaries in the functioning of complex socio-technical arrangements of water supply. Party workers and club members work alongside Councillors to
consolidate their territorial configurations, creating a ground for gaining entry into the local political race. They may play multiple and overlapping roles with contradictory interests – from maintaining standposts and deep tube wells to gathering knowledge of the piped network, helping citizens fill up application forms for household connections to becoming small-scale water entrepreneurs themselves. Their informal authority stems from their status as members of an important social institution – the neighbourhood club as well as their proximity to Councillors and their ability to get things done for residents.

The mineral water businesses add to the heterogeneity of ‘needs-driven’ practices that commonly govern access to water services in peri-urban areas (Allen et al. 2017), but remain outside of the state-led drinking water supply. Plant owners and distributors fiercely compete among themselves, often resorting to territorial ‘poaching’ to get an extra customer; practices that reveal the spaces of tension and opportunity.

To some extent, the actions and interests of the Councillors, intermediaries and private water vendors are circumscribed by the fact that they are embedded within the same locality or ‘para.’ A social formation, the ‘para’ shapes relations among local actors, attributing individual and group-based identities in relation to the locality. An important site of local politics and everyday practices, the ‘para’ signifies a space for coalitions and cooperation (Donner 2011). However, it is also inherently a site for contestations animated by inequalities, differences and multiple sets of conflicting opinions; this has an important bearing on the nature of hybrid arrangements forged between different actors in determining water access. Counter to this, the social relations that make up a ‘para’ also ensure checks and balances on the workings of Councillors, private vendors and intermediaries in the ‘para.’ Thus, individual political and economic motives are sometimes kept aside in favour of community needs and collective interests.

The understanding of ‘neighbourliness’ and social equations among diverse neighbourhood actors reveals the politics of localised everyday practices, showing how co-production is actually shaped in different contexts. A simplistic view of the word ‘co’ negates the workings of political power that shape and impact the different ways in which actors come to deliver drinking water. Moreover, it fails to capture the challenges of the process (of service co-production), which in reality is uneasy and fluid with no fixed membership, and where disparate actors work together to further their interests. These diverse webs of relationships and their mechanisms of favour-exchange and day-to-day mediation strengthens our argument that urban service delivery emerges out of a mutual need, but results in a contested dependence between state and non-state actors.

Conclusion

Our attempt in the paper has been to understand the nature of co-production, its application, and variance across cases shaped by arrangements of actors and technologies of infrastructure. We examine two different configurations of state and non-state actor equations and question the concept of co-produced services as a co-operative and collaborative alliance. The strategic cooperation and contestations that we observed in the field highlight that the term ‘co’ contradicts the workings of socio-political relations that shape how local actors come to deliver drinking water. Besides, it does not give a complete picture of the challenges of service co-production that may emerge due to the fragile and unstable nature of the relationships involved. Power asymmetries between actors, control over the diverse water arrangements and their existing inequalities of provision and access further complicate the concept of co-production as a strategy that state and non-state actors can employ to achieve sustainable, equal benefits. While there may be different ways of organisation of delivery and access to drinking water, service provisioning nonetheless, is uneven and contested.

Municipal drinking water in West Bengal is allegedly a ‘free’ basic service for all. However, Councillors determine who gets water and who does not, producing in turn, a differentiated notion of citizenship. At the same time, driven by its modernisation aspirations, Baruipur’s urban local body (Municipality) keeps up its effort to persuade the state government to expand the partial, fragmented pipe networks. Service quality, intermittent water supplies and unevenness, however, continue to exist, deepened by micro-politics and contestations. Ordinary town residents, many operating as private mineral water sellers and their distributors, lessen the everyday
uncertainty of water, its deficit and quality through diverse coping mechanisms and interventions. Their interaction, negotiations and practices hint at the authority and influence that varied actors seek to exercise, accruing or losing control over water in the process. Transformations in the socio-material relations established between water infrastructure and the web of relations embedding them shape the lived experiences of different actors. These multiple webs of partnership and authority at work, reflect fragility and volatility necessitating a constant effort to build reputation and reliability of connections both social and political.

We reiterate that local intermediaries such as neighbourhood youth club members and party men are gaining prominence, even with technology-intensive systems like piped water supplies coming in. Given the complexity of arrangements, the powers of intermediaries and their involvement in the town’s differentiated water deliveries are not getting erased. Instead, local intermediaries are continually looking at opportunities to embed themselves firmly in the newer, as well as the older water supply systems through their everyday practices of co-management and co-governance. Technology is contributing to the re-politicisation of the ‘co-production’ process. Our study, therefore, attempts to make a broader case by showing that technologies of infrastructure, can at times, produce, enforce and strengthen the local actors, their differentiated socio-political positions, and power vis-à-vis others through an intermediary role. Gaps in piped water network provisioning in the urban areas of the global South do find nascent community-led, collective efforts at service delivery. However, in a socio-political context where residents understand water as a public right and the state its sole provider, does the continued reliance on the state allow participatory, collaborative, joint service delivery to manifest on the ground?

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Notes

1. Located about 30 km away from the megacity of Kolkata, Baruipur Municipality covers an area of 9.50 sq. km.

Divided into 17 wards, Baruipur has 53,128 inhabitants (Directorate of Census Operations, West Bengal 2011).

2. KMA is the largest urban agglomeration in eastern India (1886.67 sq.km) comprising 4 Municipal Corporations, 36 municipalities and Panchayat Samitis (villages). The responsibility of planning and developing KMA rests with the Kolkata Metropolitan Development Authority (KMDA), a statutory authority under the Urban Development Department, Government of West Bengal.

3. Groundwater arsenic contamination is a common and naturally occurring problem in West Bengal. For details see Chowdhury et al. (2000). A huge public outcry against arsenic in Baruipur and its surrounding areas in the early 1990s, prompted the West Bengal government and metropolitan development authorities to hasten piped water network expansions.

4. Mineral water (reverse osmosis) RO plants are the commonly installed purification plants used by Baruipur’s private water vendors.

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