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Unequal Wastewater Rights and Claims in Gujarat: Institutional Dynamics between Urban and Rural

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ABSTRACT: Compared to long-standing scholarly debates on freshwater rights, wastewater rights discussions are in their infancy. This is because wastewater, until recently, was viewed as a nuisance. Now, wastewater, often referred to as 'used water', is considered a resource, mainly because of its use as a replacement for fresh water. Many states in India are forming policies promoting the reuse of wastewater. However, their policy framework around wastewater does not pay adequate attention to existing users of wastewater. Benefits are gained from a resource through rights granted or claims made. Institutions are authorised to grant rights, and individuals and institutions benefit from these rights at various levels. According to Ostrom and Schlager's (1992) categorisation, which was later modified by Sikor et al. (2017), this "bundle of rights" specifically includes authoritative, control, and use rights. In this paper, the authors amend this categorisation and then link it to the institutions in India responsible for dispensing each kind of right related to wastewater use. The authors thus derive an analytical framework, which they then apply to a case study examining wastewater produced by the city of Rajkot, Gujarat, India. The case study shows that though urban local bodies have authoritative and executive rights, their rights are subordinated to the union government and state government because they must align with those bodies in order to avail funds for wastewater-related infrastructure projects. Meanwhile, the existing users of wastewater are not mentioned amongst the various wastewater uses prioritised in policy instruments. The rural sector thus has limited rights granted in upcoming policies even though they are the largest users of wastewater.

KEYWORDS: Wastewater reuse, rights, claims, informal use, usufructuary rights, Gujarat, India

INTRODUCTION

Wastewater was always viewed as a nuisance leading to environmental and health problems (Fattal et al., 1986; Ensink et al., 2006; Drechsel et al., 2010; Bhullar, 2013). Now, wastewater is not considered different from fresh water and is termed as 'used water' or 'return flow' – it becomes part of the water system again, available for use. Thus, the resource value of wastewater is mainly viewed as its ability to replace fresh water. With this newfound interest in wastewater reuse, many states in India are rushing into policy measures that prescribe wastewater allocations for various users without adequate consideration for its historical and current users (see Government of Rajasthan, 2016; Government of Karnataka, 2017; Government of Haryana, 2018; Government of Uttar Pradesh, 2018; GWSSB, GoG, 2018; Niti Ayog, 2018; GIZ, 2020). However, the stigma in India associated with wastewater prevails among new users, and the technical and financial un-viability of safe wastewater use prevents states from realising the full potential of wastewater as a resource. Ontologically, wastewater seems to oscillate between stigma and resource.

The primary motivation of this research is to understand who owns the wastewater that comes out of a city and who has the right to benefit from wastewater. The paper argues that for effective

wastewater reuse, administrators must pay attention to current wastewater users, who are the largest users, rather than exploring new users through formed policies that incentivise and regulate wastewater reuse. Wastewater reuse promotion needs to include *gram panchayats,* democratically formed village-level institutions*,* as they represent the largest users.

Domestic wastewater contains nutrients such as nitrogen, phosphorus, and potassium (Shende and Chakrabarti, 1987; Minhas et al., 2022), benefitting agriculture. This has led to its widespread claim by agriculturists worldwide. Since the 17th century, wastewater has been applied to the land for agricultural production in what's known as sewage farms. Across the world, 16.6 million tons of nitrogen, 3 million tons of phosphorus, and 6.3 million tons of potassium are embedded in wastewater produced (Qadir et al., 2020: 45) annually. In India, recent policies of wastewater reuse are about reusing the wastewater within the city by changing its current rural agrarian use and putting it towards uses like gardening, car washing, flushing, construction, recreation, and industrial applications. On the other hand, with ever-increasing freshwater scarcity, growing competition for domestic and industrial needs, and the realisation that municipal wastewater is replete with nutrients, peri-urban and rural farmers are enthusiastically adopting wastewater irrigation. For agrarian users, it is rapidly becoming a resource with great value in supporting already distressed agricultural economies (Shah et al., 2016), while urban use is an effort towards Resource Recovery and Reuse (RRR) following the principle of the circular economy. Apparently, there seems to be no conflict when wastewater allocations are changed, but the contestations are for reduced river flows, part of which is due to the diversion of wastewater after its treatment. A case in point is the conflict in Tamil Nadu and Karnataka states, where wastewater produced from the city of Bengaluru has diverted away from being disposed into the river (See TNN, 2015a; Athrady, 2019; Chatterjee, 2019). The other reported case of diversion of wastewater is in Sholapur, Maharashtra, where livelihood loss of farmers has occurred alongside the thermal power wastewater reuse (Dharmadhikary et al., 2016). The diversion of wastewater to a thermal power plant happened with a tariff policy from the Ministry of Power (GoI, 2016), which mandated wastewater use for all thermal power plants within 50 kilometres of the sewage treatment plant.

This dialectic situation requires analytical and empirical examination of the process that provides resources for the city and its 'rural' outskirts. This paper examines rural-urban relations in terms of wastewater and the changing relationship between agrarian rural areas and industrial urban areas as the perception of wastewater shifts from 'waste' to 'resource'. When any object or material is considered a 'resource', it connotes that somebody can benefit from it. The benefits may occur with the rights bestowed. This is analogous to the concept of 'property'. Property is an object that belongs to someone under the rule of law. These rules and the entity that embodies them are the institutions. In the broad sense, institutions are the ones that confer rights over property.

In this paper, the authors develop an analytical framework that articulates the relationship between rights over property and institutions regarding wastewater use in India. Usually, property rights are discussed only when the resource is scarce and the demand for resources is higher than its availability. In the case of wastewater, it is disowned by a few and demanded by many; it has both dimensions. However, property rights are used to reduce uncertainty in resource availability, and they ensure resource security of use when needed.

In their framework, the authors consider institutions constituted by the rules they confer and the entity or establishment overlooking them. The definition of institutions varies; for this paper, all policies, laws, statutes, regulations, economic instruments, administrative entities, and informal rules are included. Institutions govern who can do what with the resource in question, as well as when, and how, they can do it. They do it through instruments like policies, statutes, resolutions, etc. akin to the rule of the game.

This research paper is based on the first author's doctoral dissertation (Palrecha, 2023). It employs the aforementioned analytical framework to point out gaps in policies that confer rights to the largest

current users of wastewater in rural agrarian use. The paper also identifies the influences that formed the current wastewater rights regime, pointing out that the determination of wastewater rights has ignored existing usage and users. Further, the paper argues that wastewater cannot be treated as property.

ANALYTICAL FRAMEWORK FOR THE BUNDLE OF RIGHTS AND CLAIMS

The notion of a 'bundle of rights' is an understanding that water and wastewater rights cannot be translated as ownership but need to be understood as segregated rights, such as withdrawal for use, the right to allocate a portion or alienate, the right to manage, etc. To develop an analytical framework including all such rights for wastewater, this paper consults the property rights framework by Schlager and Ostrom (1992) and the modified framework by Sikor et al. (2017). Though Ostrom's framework is associated with common property resources, it can be extended to open property resources like water (Sikor et al., 2017). This paper modifies the framework to explore the link between rights, rules, and establishments. Property rights comprise collective choice rights such as management, exclusion, and alienation, as well as operational choice rights such as access and withdrawal. These five rights are conceptualised as sticks in a bundle, each representing rights over the property. Applying the property rights framework brings out the gaps in secured resource availability. In the framework, differentiation between rules and rights is explained as such: 'rights' are products of 'rules'. Rights are specifics authorised, and rules are the instruments or prescriptions that provide the authorisation. For every right held, a rule exists that authorises and defines it. An establishment or entity makes the rules for the public good. The meaning of 'rule' is further elaborated: "Passing new law or writing new regulations are not the equivalent of establishing a new rule. Laws and regulations must be enforced to become rules" (Schlager and Ostrom, 1992: 250). The vice versa is that if the law does not permit operations that are taking place, then they are termed 'informal operations'. The individuals and organisations benefitting from them are 'informal users'. The other point made in the Schlager and Ostrom framework is that rights must have the backing of a higher authority.

Amongst the higher authorities of India, jurisprudence and planning discourses do not back the widespread use of wastewater in rural environments for agriculture. They adopt a precautionary approach regarding public health impacts and thus deem such usage to be illegitimate. Conclusive scientific assessments of the public health impact of wastewater in irrigation in India are still lacking. Such informal use is not recognised in the bundle of rights framework of Schlager and Ostrom. The framework also does not recognise claim-making, which often leads to rights when such claims are advocated to be granted as lawful rights. Thus, this paper expands the bundle of rights framework to include claim making and informal use as they are both crucial for comprehensive analysis of rights over wastewater.

The resulting framework categorises wastewater rights and claims in an array ranging from authoritative rights to informal use. These are then linked to affiliated institutions or user groups through rules or instruments that produce the rights. The framework helps to reveal if there is a gap in existing instruments that affect the rights of institutions.

1. 'Authoritative rights' include 'allocation' and 'regulation' rights. Allocation, borrowed from Sikor et al. (2017), is the right to determine priority among competing uses and identify potential uses. Regulation is exercising control over the extent of withdrawal and resource quality. These rights define the scope of 'execution rights'.
2. Execution rights include 'development', 'management', 'transaction', and 'monitoring' rights. These rights shape the mechanism through which 'use rights' are realised. 'Development' implies building infrastructure for the collection, treatment, and disposal of wastewater, and 'management' implies the operation and maintenance of infrastructure and regulation of internal use patterns. This framework does not consider alienation rights from Schlager and Ostrom's

collective choice rights, which meant the right to sell one's management rights. This is because alienation rights are not well defined in the water sector and hence may not be promulgated for wastewater for a very long time. 'Monitoring' involves recording data to identify defaulters of established standards. 'Transaction' rights are conferred to conduct activities such as selling the resource to realise its benefits. Execution rights define the scope of 'use rights'. Execution and use rights are conceptualised based on Sikor et al.'s (2017) propositions.

3. Use rights are the ability to benefit from the resource. They can be usufructuary in nature, i.e. allowing the user to use wastewater without injuring the usufructuary rights of other users. They do not entail exchange and are considered legitimate. Use rights may yield direct benefits or indirect benefits, such as ecosystem services, from resources.

4. 'Claim making' is a step towards gaining a legitimate use right. Usually, existing users demand their rightful recognition by making a demand to avail of the resource without a rule empowering them to do so.

5. 'Informal use' is an interest in wastewater as a resource without a rule that confers rights. The interest is not backed by any institution or rule. It is not organised, sponsored, financed, contracted, recognised, managed, taxed, or reported upon by governmental authorities. These uses are intentionally not monitored so that their illegitimate practice may continue. They are driven by everyday needs and are sometimes necessary for survival. For this research, informal use is defined as an interest in wastewater as a resource without a rule that confers rights.

'Formal' rights, as defined for this paper, specify a certain volume of water with the backing of instruments through executive government and legal means (laws and judgements). They are not tied to the land and are transferable or tradable. They are clearly defined and secure, amounting to property rights over the use of water (Mason and Newborne, 2013). 'Formal' denotes some form of statutory or legal recognition of the relationship (Misra, 2014). Further, for this paper, having a right entail i) recognition – by law and society, ii) reliability – assured supply of safe wastewater, not contingent upon market priorities, iii) exercisability – not subject to any other approval for its development and management, and iv) enforceability – guaranteed adjudication and implementation of the decision. In addition, this study is done with an understanding that having a right is a necessary but not sufficient condition for the security of resource availability. It is to be noted that there are limited discourses on just allocations across sectors in India. For example, policies have given minimum water requirements for drinking and domestic needs, but there is no clarity on agricultural and industrial needs (Jamwal et al., 2014: 21). Informal practices are viewed as backward, inefficient, and at times illegal behaviour that needs to be eliminated through formalisation. However, scholars have pointed to the permanency of informal strategies for users' survival due to delay in formalising the claims (Roy, 2012; Ranganathan, 2016) or because of the support of influential patrons (Gilbert, 2002). Most formalisations, especially in the water sector, are at the expense of existing informal practices carried out by disconnected people (Joy et al., 2014).

Water informality in India on several occasions has happened when laws and rights change (Alley et al., 2018). Wastewater use is at such a cusp currently with the newly formed policies on reuse.

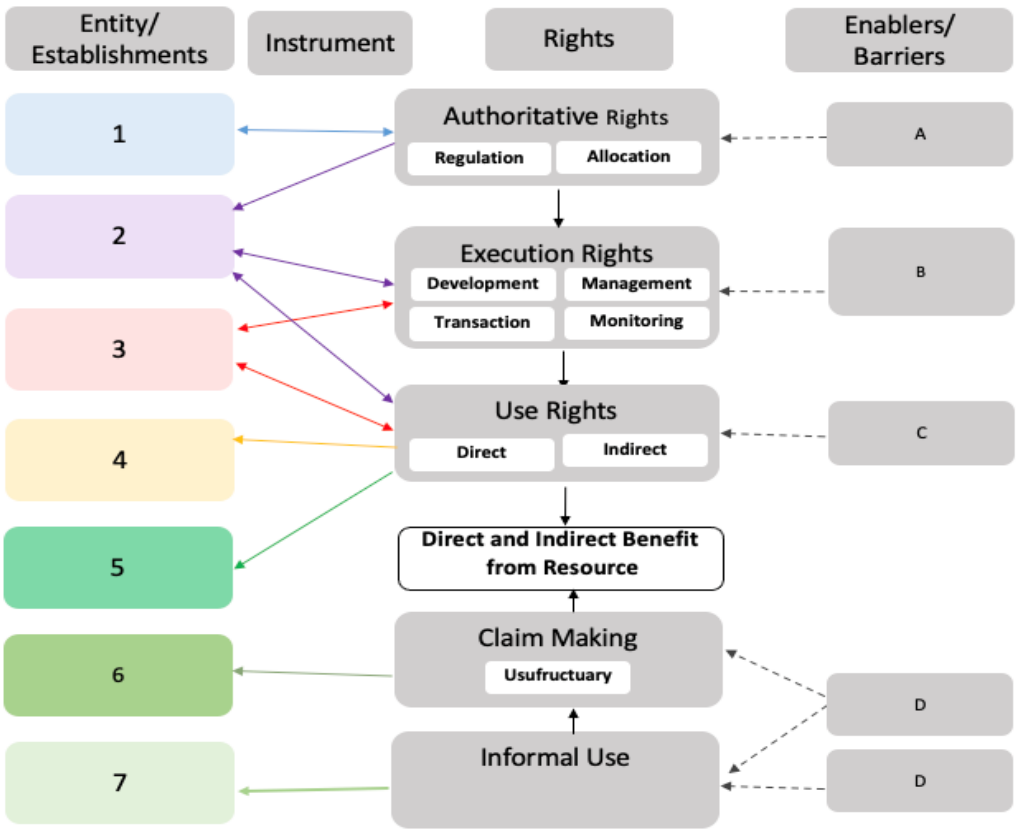
Including informal rights into the framework required a departure from Schlager and Ostrom's concepts in the proposed wastewater rights and claims framework; that is, if a particular action committed over the resource is done to demand a right without a rule, then it is termed as 'claims' in the framework. The doctrine that rights and responsibilities are coupled is embedded in the analytical framework, as it is in Schlager and Ostrom's framework. The analysis will be mindful of it for each right.

The framework developed for this paper will guide the categorisation of wastewater rights, and their relation to institutions and organisations that protect, exercise, and benefits from them. These arrays of

rights will be linked through instruments, i.e.; rules, to entities and establishments that confer the rights or are beneficiaries of those rights. The entities also may be hierarchical from national or international to local, as per the context of the study site.

The framework also recognises certain barriers to realising rights and claims over wastewater. This often results in disinterest and waivers of use rights. At the same time, there will be influences and enablers for the realisation of rights. It is crucial to reflect on them to understand how their rights are shaped. A representative relation between instruments, entities, barriers, and influences shapes wastewater rights and claims together and is conceptually presented in Figure 1.

Figure 1. Framework for bundle of rights and claims over wastewater.



The entities and establishments concerned with wastewater use will be in the first column, and instruments such as policy, rules, guidelines, legislation, constitutional articles, treaties, etc. will be studied to link them with the kind of rights they confer on institutions and individuals. The framework will also link the organisations that benefit from such rights. For example, urban local governments are given execution rights for managing, developing, transacting, and monitoring through a union government instrument – the *National Urban Sanitation Policy* (NUSP) of 2008 – so they can prepare and implement their own city sanitation plans, including works for wastewater collection and treatment. In turn, urban local bodies (ULBs) have given the execution rights to the private sector. Hence, the ULBs have acted in the public interest as an institution to bestow execution rights to the private sector for the expansion of infrastructure. ULBs are benefiting from execution rights granted by the union government to decide on whether they would execute the project themselves or outsource it. A total of 113 such instruments are studied to establish linkages between entities and categorise the rights gained or given. Key instruments are presented below.

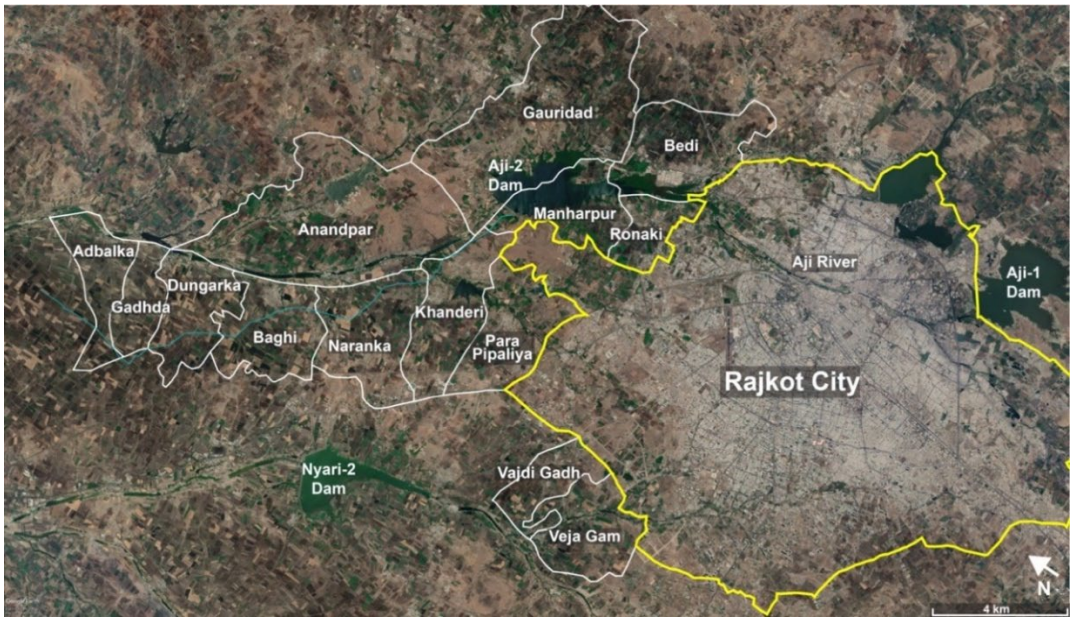
SEWER-COMMAND AS STUDY SITE

The extent of wastewater flows, or the territorial boundaries of their flows, needs to be demarcated to gauge wastewater use. This is crucial as wastewater use is likely to the extent of its physical availability. Rights can be ascertained only with physical availability. The land area extent where wastewater flows is termed as 'sewer command', borrowing from the definition of 'irrigation command'. The boundaries of sewer-command vary spatially and temporally; however, they can be defined for a specific time. Modification of sewer-command influences rights. By diverting wastewater flow, existing rights are subverted, and newer rights are bestowed where it is made available.

This paper applies the analytical framework of the bundle of rights to empirical findings from the city of Rajkot and its surroundings in Gujarat, India. Rajkot presents an appropriate case for applying the framework because it demonstrates a diversity of institutional and infrastructural arrangements between wastewater users and the local government, as well as containing significant informal use in the city's proximity. Though Rajkot is an industrial city, its main manufacturing and engineering industries do not produce harmful industrial effluent. The study is limited to municipal wastewater and the rights over it.

The primary data used to delineate the sewer-command was collected using satellite images and transect walks. Participatory rural appraisals were conducted based on observation of the transect using satellite images as a tool. A transect along the wastewater flow path showed sewage passing through sewage treatment plants (STPs), being treated by STPs, bypassing STPs, and running untreated from *nallas,* drains carrying wastewater, that were to represent the areas where wastewater flows. There were 14 villages in the sewer-command of Rajkot city and in parts of Rajkot Municipal Corporation (RMC) where wastewater flows in the nallas is shown in Figure 2.

Figure 2. Sewer-command of RMC.



Rajkot is in the centre of the Saurashtra region of Gujarat State, spread across both banks of the Aji River and remaining entirely within the river basin. The river flows through the city, dividing it into two parts. The RMC area is bounded by Aji 1 and Aji 2 dams. Tributaries flowing through the city are converted into nallas carrying wastewater. There are six operational STPs in RMC.

Currently, Rajkot receives a total freshwater supply of 304.6 million litres per day (MLD), of which 64.6 MLD is from its local source and the rest are from distant sources. The major water supply is brought to

the city via pipelines or canals from the Sardar Sarovar Dam, located 400 kilometres away. The water loss in Rajkot is reduced to half, about 20 % as the conveyance is through pipelines, as mentioned by an RMC City engineer; 60.9 MLD water is lost. Rajkot population projection is 18.57 million in 2021 based on the census 2011 (RUDA, 2015: 15). Thus, Rajkot's per capita freshwater delivery comes to 130 LPCD (litres per capita per day). There is a significant amount of water self-provisioned by the city residents via privately-owned borewells. An estimate provided by the RMC City Engineer indicated that unaccounted groundwater consumption might account for approximately 100 MLD, thereby raising the per capita consumption to 180 LPCD. Thus, the city's overall consumption comes to 343.6 MLD. Applying Central Public Health & Environmental Engineering Organisation (CPHEEO) norms, the total quantity of wastewater thus generated by the city would account for 80%, or 274.9 MLD, of the total water consumed (CPHEEO, 2013: 3). Of this, 170 MLD is treated by the six STPs of the city. Therefore, it can be inferred that the remaining 104.9 MLD of wastewater is released untreated into the watercourses.

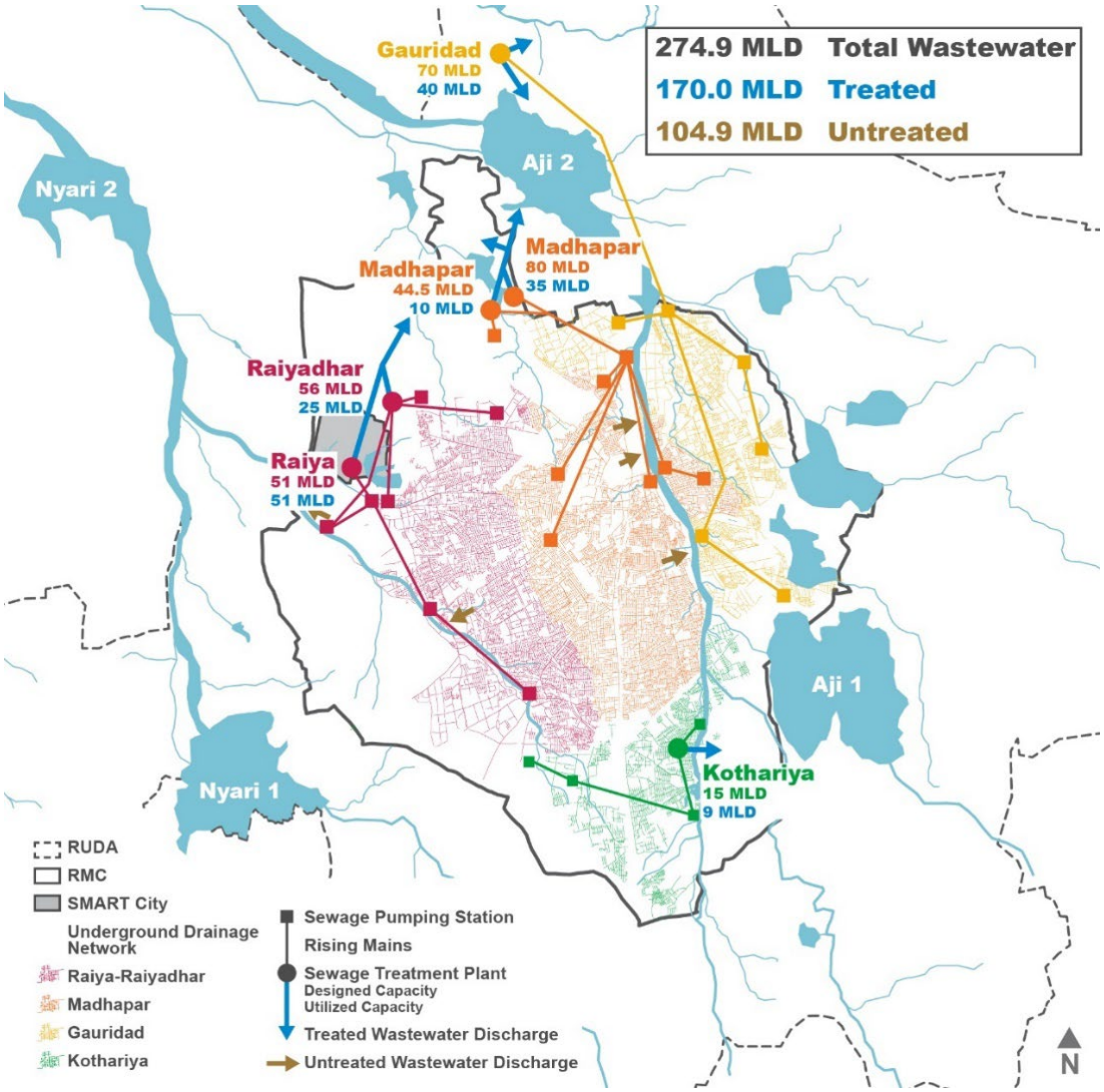
RMC's six STPs have different discharge points for the treated wastewater. Kothariya STP releases its treated wastewater into the Aji River, where it flows downstream and accumulates in the Aji-II Reservoir. Gauridad and both Madhapar STPs release directly into the Aji-II Reservoir. The Raiya and Raiyadhar STPs have a shared outlet near a natural drain in Ghanteshwar Village, from where the wastewater meets the Aji River downstream of Aji-II Dam. It is beyond the scope of this study to map every point where untreated sewage may be released; however, there are some noticeable patterns. Field observations and Rajkot City GIS drainage maps reveal that certain slums in the city lack household drainage connections or connections to the trunk sewer. The wastewater from these slums collects in the natural drains in the city and flows into the Aji River. Examples include, but are not limited to, Rukhadiya Para and Narshang Para in the east zone, Jilla Garden and Laludi Vokali in the central zone, and Jay Bhimnagar in the west zone. Google Earth satellite imagery's extensive search at different points and field observations reveal incidences of raw sewage bypassing the sewage pumping stations into the natural drains. Treated and untreated wastewater flows are represented in Figure 3.

METHODOLOGY

This case study only considers municipal wastewater. Authoritative, executive, and use rights over wastewater are identified from various instruments that confer these rights. Instances of claim-making are derived from official correspondences between the municipal corporation and the claimants. A total of 113 such instruments were gathered and studied from various sources, including the public domain, municipal offices and their correspondence, private parties, and individuals. Key instruments are presented here.

For this research, it was important to gather the whereabouts of wastewater users. There is no information available about wastewater use in Rajkot. Therefore, connections with potential information-rich individuals such as experts, academics, RMC officials at all levels, village panchayat leaders, village leaders, STP operators, environmental activists, irrigation and agriculture department officials, health professionals, Rajkot Urban Development Authority (RUDA) officers, taluka panchayat and Zilla panchayat officers, ward officers, elected representatives (current and past), citizens (rural and urban / users and non-users), smart city officials, builders, developers, Asha workers, lawyers, consulting experts, cleaners of on-site sanitation systems, and pollution control board officials (current and past), as well as institutions like development agencies, industries, industrial associations near Rajkot city, and planning offices of the smart city were made. Initially, semi-structured interviews were employed with them, but they did not elicit responses, so unstructured interviews were conducted. Statutes, laws at the union and state levels, policies, schemes, missions, notifications, directives, advisories, guidelines, administrative orders, court orders, case laws emanating from the judiciary, standards, and regulations, as well as resolutions, reports, and proposals of local administrative bodies, were gathered and analysed to link them with rights and institutions.

Figure 3. Treated and untreated wastewater flows of Rajkot.



A total of 50 farmers were surveyed for their crop production details. Two Focussed Group Discussions (FGD) with men and women separately in each sewer-command village were conducted; thus, a total of 28 FGDs, each with men and women, were conducted. Wastewater use for agriculture was found within RMC limits, and four farmers were surveyed within RMC. A total of 20 semi-structured interviews were conducted with the relevant people mentioned above.

The bundle of rights and claims for Rajkot's various institutions and user groups are juxtaposed with the reported uses of wastewater to assess gaps in institutions' existing instruments for realising the optimal benefits of the city's wastewater.

ENTITIES, INSTRUMENTS AND RIGHTS

Institutions are defined as "sets of ordered relationships among people which define their rights and exposure to the rights of others" (Schmid, 1972: 893). Institutions are defined in the theory of New Institutional Economics as such: "Institutions consist of formal rules and informal constraints along with their enforcement characteristics" (North, 1992: 9). The term 'property rights' covers the individual

components of these relationships that form institutions. Ostrom (Ostrom, 2010) defines institutions as a set of rules that are "prescriptions commonly known and used by a set of participants to order repetitive, interdependent relationships". These definitions are useful for this paper. Using them as a base, the study proposes a limited conception of the 'institution' as a system that has a social structure with rules (behaviour rules, convention rules, and legal rules), norms, and strategies. Institutions comprise two components – entities and instruments. Entities and instruments shape each other. Entities make the rules of the game, intending to do public good (North, 1992). Instruments are the rules themselves. They may be legal, policy, or financial. They include statutes, laws at the union and state levels, policies, notifications, directives, advisories, guidelines, administrative orders, court orders, case laws emanating from the judiciary, standards, regulations, and resolutions of local administrative bodies. The instruments that affect wastewater use also include various missions, schemes, and projects. Audit reports, recommendations of various commissions and committees, and performance reports also shape wastewater instruments and rights.

As wastewater is considered additional water or as part of the available water resource, it is important to discuss both 'water rights' and 'the right to water' to arrive at an understanding of wastewater rights. Generally, water rights refer to legal entitlements or permissions granted to individuals, communities, or organisations to access and use water resources. These rights are often established and regulated by governments or relevant authorities. On the other hand, the right to water is a broader concept that refers to the basic human right to access clean, safe, and affordable water for personal and domestic use. Scholars have regarded water rights as a subset of the right to water and specifically look at the point of view of the right holder (Sangameswaran, 2007: 26). The interconnection and interdependence of water and wastewater pose another question of whether water and wastewater rights should be separated. Within a 'one water' perspective, water and wastewater are a continuous cycle, and water rights should therefore include wastewater rights. Integration of water and wastewater rights also emanates from circularity concepts. The limit of circularity is not recognised in circularity discourses, and it promulgates the belief that using advanced technologies and market instruments would result in circularity independent of natural processes. For example, water consumption losses may be reduced with technology, but the evapotranspiration and water requirements of the crops remain unchanged (Haas et al., 2015). The limits of technology to reduce and reuse is also not acknowledged. There are several such definitional questions about the rights to water/wastewater, but for institutionalising rights and for setting a priority for the uses and users of various waters, it is necessary to consider wastewater rights separately. By emphasizing the distinct challenges and requirements between water and wastewater governance, it may be easier to prioritise resources and develop specific policies and strategies for each area.

Internationally, the most comprehensive description of the human right to water is in General Comment36 No 15 of the 1996 International Covenant on Economic, Social, and Cultural Rights (ICESCR): "the human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses" (UN Committee on Economic, Social and Cultural Rights, 2003). It does not include rights to irrigation water.

In the Indian Constitution, socio-economic rights are in Part IV, known as directive principles for policy formulation by the individual states of India. Water rights, basic services, and livelihood are not fundamental rights but are implied in articles of Part IV. Article 39 directs for secure and adequate means of livelihood, and Article 47 for raising nutrition, public health, and standard of living (Patel, 2016: 17).

Borrowing from Priya Sangameswaran's *Review of Right to Water* (Sangameswaran, 2007: 12-15), water and wastewater rights are unlike the right to water in that they are normally for uses other than basic needs. These rights have three dimensions: socio-legal, technical, and operational. This paper looks at the socio-legal dimension.

International entities and instruments shaping wastewater rights

International influence in wastewater governance in India arises through United Nations organisations such as the World Health Organization (WHO), the United Nations Environmental Programme (UNEP), and the Food and Agriculture Organization (FAO), in addition to the World Bank. Internationally, developed countries are equipped to handle wastewater-related infrastructure with technology and finances and often advocate a principle of risk-aversion and precaution regarding wastewater. Sanitation Safety Planning (World Health Organization, 2016), a manual developed by WHO, prescribes a step-by-step approach to risk management in sanitation systems that is suitable for developing countries with lesser financial and technological means. A pilot of the sanitation safety plan is carried out in Devanahalli, Karnataka in the year 2014-15 by Karnataka Urban Water Supply & Drainage Board in partnership with the WHO (World Health Organization, n.d.).

The other two principles that influence wastewater governance in India are polluter pays and additionality. Additionality is when a government can raise funds for a project from another organisation. This is viewed as an added value to the government's available finances and was recommended in the Stockholm Declaration's Principle 12 (Pinto-Bazurco, 2020). For safe sanitation, governments use additionality to mobilise investments from organisations with different objectives than the government's overarching objective of ensuring the public good by investing alongside those organisations to reduce the risks of inadequate sanitation (Du et al., 2019). With the rise of the additionality principle in the neo-liberalised era, states went from being sole developers and managers to being facilitators for attracting private utilities, and multi-national engineering companies took over part of the governance process from the states. Additionality is about investments. It connotes a focus on economic and market-led instruments, and the investments usually require returns to the extent of profit. Along with neo-liberalisation in the same era, de-municipalisation and privatisation happened simultaneously. Water was slowly viewed as a marketable resource; even wastewater is gradually being viewed as a marketable resource. Infrastructure remains a focus for the service delivery of water and wastewater. Users were viewed as customers who must pay the cost to avail of the service, thus limiting the availability of wastewater that was historically commonly used to a few who could afford it. The private sector argued a business case for recovering the wastewater (Holmgren et al., 2015; Otoo and Drechsel, 2018). In partnership with the World Bank, Maharashtra has floated tradable wastewater reuse certificates to promote wastewater reuse by municipalities. This is done with the formation of the Maharashtra Water Resources Regulatory Authority to make Water Entitlement Transfer (WET) and Wastewater Reuse Certificates (WRC) Platform Regulations, 2019.

The 'polluter pays' tenet has been advocated and adopted by many developed countries to integrate the cost of pollution into the production cost of industry. The Organisation for Economic Cooperation and Development (OECD) recommended it in 1972, and the European Union subsequently approved it in 1973 (Cordato, 2006; Munir, 2014; Zhu and Zhao, 2015). It is also mentioned in Principle 16 of the Rio Declaration on Environment and Development (1992). For implementing the polluter pays principle, pecuniary judgements are a tool. They require those accountable for pollution to pay damages to specific persons or organisations and pinpointing polluters is challenging. India statutorily recognised the polluter pays principle with the formation of the National Green Tribunal in 2010. It has jurisdiction over cases and offences under the Environment (Protection) Act of 1986 (See MoEF, GoI, 1986).

The key instruments for each of the establishments in the union and state governments, ULBs, private sector, gram panchayats, urban cooperatives, rural cooperatives, and the population of individual rural users are described in the following tables. In the analytical framework, instruments that do not directly grant rights or benefits are presented as influences or barriers to the execution of rights.

Table 1. Key international instruments.

Entities/ Establishments	Instruments	Autho-ritative rights	Executive rights	Use rights	Infor-mal use
UNEP, GEF	Additionality, Stockholm Declaration Principle 12, 1972	US	PS	PS	
Rio Declaration on Environment and Development	Principles 15 and 16, Precautionary Principle, 1992	US			
OECD and EU	Polluter Pays Recommendation, 1972	US UL			
WHO	Sanitation Safety Planning: Manual for Safe Use and Disposal of Wastewater Greywater and Excreta. World Health Organization, 2015				RC

Legend:

U	Union & State Government	U	Urban Co-Operative and Individual
U	Urban Local Bodies	R	Rural Co-Operative
P	Private Sector	R	Rural User
G	Gram Panchayat		

Constitutional instruments shaping wastewater rights

The institutional entities in India emerge from the three pillars of India's democratic governance structure – the executive, the judiciary, and the legislative. In addition, there are independent regulatory bodies, such as those formed through the Maharashtra Water Regulation Act of 2005.

The Constitution grants the government the right to allocate surface water resources. The question of whether the allocation right of the union or state government is an absolute right as 'eminent domain' or that of being a trustee as in a 'public trust' embedded in a 'sovereign state' is debatable on constitutional grounds (Upadhyay, 2009). Article 48A formed by the directive principles enjoins a duty on the states to safeguard and better the environment, forests, and wildlife. This article is also known as the public trust doctrine for environmental health and demands affirmative action from the states for the protection of the environment for public use. This is used by the courts to lay out the fundamental duties of the state and citizens to abate pollution. However, directive principles are not justiciable, which means that the court cannot enforce them (Boruah and Naz, 2020). This has implications for authoritative rights.

The division of power between the union and state governments is given in Article 246. The legislative jurisdiction of the state governments includes both water supply and wastewater treatment. These articles shape the authoritative and execution rights of the union and the state governments.

Nationally, though water and sanitation are state subjects, the enactment of the 73rd and 74th Constitutional Amendment Act (CAA) made local bodies like panchayats and municipalities responsible for water-related issues. This has a direct impact on executive and authoritative rights of panchayats and municipalities.

In the Indian Constitution, socio-economic rights are in Part IV, the *Directive Principles of State Policy*. Water rights, basic services, and livelihood are not fundamental rights but are implied in articles of Part

IV. Article 39 directs for secure and adequate means of livelihood (Patel, 2016: 17). As the right to livelihood is established through case laws only, the informal use can be legitimised only when claims are made by the users and accepted lawfully.

Table 2. Key constitutional instruments.

Entities/ Establishments	Instruments	Autho-ritative rights		Executive rights		Use rights			Infor-mal use
Constitution	Sovereign Country, Public Trust	US	UL						RU
Constitution	Riparian Rights	US	UL	US			UCI	RC	RU
42nd Amendment Act, 1976	Directive Principles of the State Policy – Article 48 A, State Duty to Protect Environment	US							
Constitution Article 246, List II Schedule VII and Article 248	Constitution Article 246, State Subjects List Constitution Article 248, to make the law and amend it	US		US					
Constitution	73rd and 74th amendments, Constitutional status to PRI and ULB		GP UL		GP UL				
42nd Amendment Act, 1976	Directive Principles of the State Policy – Article 39, Right to Livelihood and Equal Justice								RU

Union government entities and instruments shaping wastewater rights

Water and sanitation are state subjects, and the allocation and regulation rights over water and wastewater resources lie with the state governments; however, the regulatory rights pertaining to environmental quality are ceded by the states to the union government. Enactment and promulgation of all aspects of pollution regulation remain with the union government. In 1972, the Stockholm Convention resulted in the union government's adoption of precautionary principle-based disposal standards and the enactment of the Water Act (MoEF, GoI, 1974). Though water and sanitation are states' issues, the union government is the main source of financing for capital-intensive water/wastewater infrastructure. The union government also has the right to make legal instruments for disposal or pollution control. The primary rights and responsibilities of wastewater governance, including its reuse, lie with the Ministry of Housing and Urban Affairs (MoHUA). The disposal standards are promulgated by the union government's Ministry of Environment, Forest and Climate Change and are adhered to by the state governments. Thus, various policies of safe use, disposal standards, and service level benchmarking are drafted by union government advisories or departments, as listed in Table 3.

For use rights, the most important instrument is 'riparian rights'. Riparian rights to such water are also strengthened through the easement act (Indian Easement Act, 1882). The riparian rights are recognised by Indian jurisprudence in some contexts and negated in others as it is not protected by the constitution and is supported by case laws only (Mampilly, 2005). All riparians have usufructuary rights on the flow or collection of watercourse, but it is unclear if it is limited to natural flows or includes wastewater flows too.

Table 3. Key union government instruments.

Entities/ Establishments	Instruments	Autho-ritative rights		Executive rights		Use rights		Informal use	
Parliament	National Green Tribunal Act 2010	US	UL						
Parliament Colonial Legacy	Indian Easement Act, 1882 (Riparian Rights)	US		US	UL				
Union Government	Safe Reuse of Treated Wastewater, 2020	US			UL				
MoEF	General Norms for Disposal of Wastewater, 1986	US			UL				
MoEF	Draft Norms for Disposal of Wastewater, 2015	US			UL				
GoI	The Prohibition of Employment as Manual Scavenger and Their Rehabilitation Act, 2013	US			UL				
MoEF & CC	Notification for Disposal of Wastewater, 2017	US			UL				
NGT	Order 2019 Nitin Deshpande vs Union of India for Disposal of Wastewater, 2019	US		US	UL				
MoUD, GoI	National Urban Sanitation Policy, 2008	US		US	UL				
Ministry of Water Resources	Draft National Water Policy, 2002 and 2012	US		US	UL				
CPCB, MoEF	Guidelines for Utilisation of Treated Effluent in Irrigation, 2019	US							
Ministry of Jal Shakti, GoI	Jal Jivan Mission	US							
MoHUA, GoI	Jal Jivan Mission – Urban	US		US	UL				
CPHEEO, MOHUA	Handbook of Service Level Benchmarking			US	UL				
MoEF	The Water Act, 1974, and The Environment Protection Act, 1986	US	UL	US	UL				
Ministry of Power	Power Tariff Policy, 2016	US				PS		PS	

State government entities and instruments shaping wastewater rights

The authoritative rights to govern wastewater are shifted to the Urban Development Department (UDD) in Gujarat, aligning with the shift at the union government. As wastewater is considered a replacement for fresh water, the Ministry of Water Resources is an important stakeholder for wastewater reuse. In Gujarat, Narmada, Water Resources, Water Supply Department and Kalpsar Department (NWRWS), and Sardar Sarovar Narmada Nigam Limited (SSNL) – wholly owned Government of Gujarat state company hold the water resources, including irrigation and bulk water transfers. A major objective of wastewater governance is related to environmental outcomes. Therefore, the Ministry of Environment is the nodal

agency for setting standards and monitoring pollution. The judiciary engages in delivering justice on these matters. For regulating groundwater, the absence of metering and clearly established rights leads the Gujarat State Government to regulate the power supply for agricultural pumping by separating the agricultural electricity feeders (GoG, 2003). Rationed electricity has reduced access to groundwater and spurred farmers' shift to wastewater irrigation where it is possible.

Table 4. Key state government instruments.

Entities/ Establishments	Instruments	Autho-ritative rights	Executive rights			Use rights	Informal use
GWSSB, GoG	Reuse of Treated Wastewater Policy, 2018		UL	US	UL		
NWRWS, GoG	Draft Gujarat Water Policy, 2018			US	UL		
UDD, GoG	Gujarat State Policy for Promotion of Wastewater Recycle and Reuse, 2017		UL	US	UL		
UDD, GoG and Gujarat Municipal Finance Board	SJMMSVY			US	UL		
Union and State Governments	JNNURM Optional Reform		UL	US	UL	PS	
Union and State Governments	Smart City Mission		UL	US	UL	PS	
Union and State Governments	AMRUT, AMRUT 2.0		UL	US	UL	PS	
MoUD, GoG	The Gujarat Municipalities Act, 1963	US	UL	US	UL		
SSNNL, GoG	Resolution for Water Charges, Pub. L. No. WTR/2005/41/P (2018) and VWS/102013/167/KH -4 (2018)			US			
Gujarat Vij Company, GoG	Gujarat Electricity Industry Reorganisation and Regulation Act, 2013			US			

Within a span of one year between 2017 and 2018, the Government of Gujarat introduced two new wastewater reuse policies. The first responded to the state's compulsion to be eligible for funding from the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), and the second was a response to the discourse on treated wastewater use. A year later, the Central Pollution Control Board (CPCB), a union government agency that monitors pollution, introduced an industrial wastewater reuse policy. While the CPCB policy prescribes the disposal standards of 1986, Gujarat State's two policies have more stringent standards. As such, three wastewater reuse policies are currently promulgated by state and

union agencies in Gujarat. They are described in Table 5. In addition, a wastewater reuse policy was formulated recently on a national level (GIZ, 2020). The national policy is to guide the states that have not made wastewater reuse policies or need amendments. The Policy for Reuse of Treated Water, Gujarat (GWSSB, GoG, 2018) and the wastewater reuse policy of Haryana state are quoted as model policies in the national policy. They had brought out the reuse policy prior to the national policy.

Table 5. Comparison of wastewater reuse policies in Gujarat.

(UDD, GoG, 2017)	(GWSSB, GoG, 2018)	(CPCB, 2019)
Wastewater Use	Treated Wastewater Use	Industrial Effluent Use
Policy formulation as required for obtaining AMRUT funds	A response to the discourse on treated wastewater use	A response to NGT order No. 348/2017
For municipal wastewater reuse	For municipal wastewater reuse	For industrial wastewater reuse
Prioritises agricultural use, then municipal	Prioritises industrial use, then municipal, and lastly agricultural	For use by industries that cannot comply with Zero Liquid Discharge
Objective is to use wastewater as replacement for fresh water	Objective is to generate revenue	Objective is to assist industries in using wastewater specifically for agriculture
ULB responsible, polluter pays	Treated wastewater cells, State High Power Committee (SHPC), and State Technical Committee (STC) to be constituted for management	Agricultural experts to be consulted
Main objective is pollution prevention by reuse, rates not specified	Objective is promoting wastewater use for industries, wastewater price lower than freshwater price	Objective is safe use of industrial waste
Disposal Standards – as in force	Disposal Standards – as in force	Disposal Standards 1986

These policies are clearly conflicting, and each one is an effort to serve a specific agenda. Unlike laws, policies can be conflicting. Executors become confused as they treat policies as laws. They are perplexed when they need to assign wastewater reuse.

Swarnim Jayanti Mukhya Mantri Shaheri Vikas Yojana (SJMMSVY), the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), AMRUT, and Smart City schemes are various schemes for financing water supply and sewerage infrastructure. The ULBs access these funds through the state or union governments. The state governments act as nodal agencies between the ULBs and the union government to avail funding.

Water charges are fixed through resolutions by the state government. To promote wastewater irrigation by industries, the treated wastewater charges are fixed at 1/3 of what the RMC charges the industries for fresh water. In 2021, charges for fresh water fixed by the state government were Rs 3.35 for drinking water and Rs 51.45 per 1000 litres for industrial water. For agriculture, it worked out to be Rs 8.33 per 1000 litres of water (based on resolutions WTR/2005/41/P and WTR/1084/28/P).

The National Sanitation Policy (MoUD, GoI, 2008) and the National Water Policy (National Water Policy [Draft], 2002; 2012) were drafted by the union government. They required states' approval before their enactment as water and sanitation are state issues. The National Sanitation Policy viewed wastewater reuse as a component of environmental protection and wastewater treatment. To fulfil these purposes, the union-level Ministry of Urban Development (MoUD), now renamed as the Ministry of Housing and Urban Affairs (MoHUA), recommended the adoption of the Service Level Benchmark. Because wastewater treatment is a state subject, this results in a redundancy of functions and institutions at the union and state levels (Breitenmoser et al., 2022).

Legal instruments like these take a very long time to be effective. In order to be enacted, these measures must first pass through parliament, where political and financial interests create opposition to their approval. One example of this phenomenon is the disposal standards. First brought into force in 1986, they were later amended in 2015 and 2017 and then changed by court order in 2019. There seems to be no clarity on which standards are in force due to various ongoing legal processes at multiple locations. Though there are many policies at the union and state levels, still there are no clear reuse standards specifying reuse applications.

Urban local bodies and their instruments shaping wastewater rights – A case of Rajkot

The 11th schedule of the 73rd CAA and the 12th schedule of the 74th CAA list water supply and sanitation as functions to be devolved to ULBs by the state government. In Gujarat, the development and management rights over water supply and sewerage schemes are devolved. But local bodies depend on the state government because freshwater supplies and wastewater disposal are out of their territorial jurisdiction. The local bodies' responsibility is delivering services; however, they depend on other jurisdictions for their water resources, and thus the state is a mediator for such transfers.

Table 6. Key instruments of a ULB – Rajkot City.

Entities/ Establishments	Instruments	Autho-ritative rights		Executive rights		Use rights				Informal use
RUDA	Comprehensive General Development Control Regulations, 2017, Part III – Performance Regulations	US	UL	US	UL					
General Board, RMC	General Board Resolution No.11 on Reuse of Treated Wastewater in Rajkot City, 2018		UL			UL	PS	UCI	RC	
Standing Committee, RMC	Standing Committee Resolution No. 8 on Reuse of Treated Wastewater in Rajkot City, 2018		UL			UL	PS	UCI	RC	
RMC	Executive Order for Reuse of Treated Sewage Water from Various Sewage Treatment Plants of Rajkot, 2018		UL			UL	PS	UCI	RC	
RMC	Rajkot, India: Decentralized Waste Water Treatment System for Open Streams		UL		UL	PS				
RMC	Budget and Plans				UL	PS				

The City of Rajkot forms development control regulation with the authoritative rights received from the Gujarat Municipalities Act of 1963. RUDA was constituted to prepare development plans and regulations. RUDA formulated the General Development Control Regulations (GDCR).

In 2008, NUSP recommended that ULBs prepare their own comprehensive city sanitation plans to achieve various policy targets, such as expanding wastewater collection, treatment, and reuse in an integrated manner. However, the Gujarat State Government never came up with a state-level sanitation policy directing cities to implement the NUSP recommendations.

RMC outsources the development and management of sewerage infrastructure to private sector service providers. At present, all of Rajkot's six existing STPs and 25 sewage pumping stations have been developed and managed by private contractors. Wastewater rates are contingent upon freshwater rates that are fixed by the state government.

An exercise of tracing Rajkot's urban wastewater flows offered several insights:

1. Rajkot's total wastewater generation amounts to 274.9 MLD, of which 170 MLD, i.e. 62%, is treated, whereas the remaining 104.9 MLD, i.e. 38%, is untreated.
2. All this wastewater gets discharged into the city's various watercourses, and a large part of it accumulates in the Aji-II Reservoir. Rajkot's wastewater flows extend beyond the urban boundaries of RMC and RUDA and further into the rural areas.
3. Farmer surveys and remote sensing data reveal agricultural use amounting to 210 MLD, which is 76% of the total wastewater produced by the city. The 14 villages and cultivated parts of RMC that practice wastewater irrigation constitute the sewer-command area of the city.
4. Despite the immense scale of wastewater cultivation, the agricultural use of wastewater is underreported by Rajkot's urban and rural institutional entities.
5. The urban-rural water-wastewater metabolism begins with diverting fresh water from rural areas to the city for consumption by urban users. In the city, the fresh water goes through a metabolic transformation into wastewater. Following that, the treated and untreated wastewater is discharged from the city and into the sewer command region, where 76% of it, or 210 MLD, gets used for irrigation, as detailed in Table 3. In this process, the main constituents of wastewater-water and nutrients undergo metabolic transformation into large quantities of agricultural yield. Wastewater in terms of crops is provided in Table 7.

In many cities in developing countries, untreated or partially treated domestic wastewater is used for agriculture in urban and peri-urban areas. Though such practices pose a potential public health risk to farm workers, as well as nearby communities and consumers, they do provide important livelihood benefits and perishable food, such as vegetables, to cities (Raschid-Sally and Jayakody, 2009). The disposal standards in India are also based on precautionary principle, like most of the countries. Some countries like Mexico have disposal quality standards based on the carrying capacity of receiving water bodies. While it is not explicitly mentioned that India's disposal standards are modelled after some other standards, they are at par or even more stringent than those of many developed nations (Mitra, 2021). Among developed nations, the disposal standards were first promulgated by the US-mandated rule that wastewater for the irrigation of edible crops meets the microbial quality of drinking water, though a lot of river water used for irrigation did not meet such stringent standards. The standards were intended to be 'zero-risk' and 'precautionary' but lacked adequate epidemiological backing. Meeting those standards required expensive and technologically advanced treatment infrastructure that was only viable for advanced economies and placed an unreasonable barrier to wastewater use in developing countries with lower incomes. This argument is exemplified by a recent incident near Shahpura, Madhya Pradesh: Local authorities burnt large tracts of sewage-irrigated vegetable crops cultivated by fifty farmers in response

to public interest litigation citing a public health risk even though they had not tested the produce to assess its pathogen load (TNN, 2015b).

Table 7. Wastewater use for agriculture in sewer-command region.

Crop	Gross wastewater-irrigated area (ha)	Water requirement (ML/ha)	Total waste-water used in irrigation (ML/yr)	Yield in tons
Alfalfa	773	10.6	8194	561
BT Cotton	798	10.6	8459	498
Castor	387	9.8	3793	811
Groundnut	274	6.5	1781	603
Juwar	1144	6.4	7322	1535
Makai	373	4.5	1680	692
Rose	125	10.5	1313	1091
Soybean	109	3	327	132
Vegetables	1689	23.8	40198	16409
Wheat	1063	3.7	3933	3379
Total	6735		77000	25711
Million liters per day (MLD)			210	

During the field interviews, farmers reported a drop in their fertiliser use while irrigating with wastewater due to its rich nutrient content. The annual nutrient recovery from 210 MLD of wastewater is found to be 4599 T of Nitrogen, 1533 T of Phosphate, and 3066 T of Potash using the average concentration values suggested by Shende and Chakrabarti (1987: 282). The calculations are included in Table 8.

Table 8. Annual nutrient recovery from wastewater in sewer-command area.

Nutrient	Concentration in WW (mg/L)	Concentration (T/ML)	Annual nutrient recovery from 77000 ML of WW (T)
Nitrogen	60	0.06	4599
Phosphate	20	0.02	1533
Potash	40	0.04	3066

The quantification of wastewater use provides important pointers for rights and claims as it captures current uses that can be considered 'prior appropriation'. It also shows that wastewater value goes beyond simply replacing fresh water as it is also a significant contributor of nutrients required in agriculture. However, in the policy discourse, wastewater and its entitlements are linked only to water rights due to this association of water and wastewater.

In Rajkot, the use rights conferred on urban and rural users through resolutions and regulations are manifested differently. These are discussed below.

Urban sector – Use rights and disinterest

RMC passed a resolution in 2018 for selling treated wastewater to industries at half the price of fresh water. Despite this, no industries showed interest due to a combination of social stigma and easy groundwater availability on site. RMC incentivised decentralised wastewater treatment and use in urban housing societies; however, not a single society in the city has taken this up. Of the 274.9 MLD of wastewater produced by the city, a meagre 0.2 MLD is reportedly used for watering municipal gardens.

Rural sector – Use rights, claims, and informal use

Rajkot's history of farmer cooperatives availing wastewater for irrigation from the RMC goes back to the 1960s. Rajkot is one of the few cities that had an arrangement of swapping fresh water used for city consumption with wastewater used for farming through two farmer cooperatives, Shri Ramjino Valve Sahkari Mandali Limited and Shri Sullage (Sulaj) Water Sahkari Mandli Limited. At present, there are two cooperatives, Ishwariya Piyat Sahkari Mandali and Shri Anandpar Piyat Sahkari Mandali Ltd, who avail treated wastewater from RMC's STPs through pipelines at the price of fresh water in accordance with the resolution passed by RMC in 2018. None of the contracts, past or present, have defined RMC's obligation to supply wastewater. Wastewater is not allotted through universal, exclusive, or transferable rights, indicating that it is not property. The rights conferred upon the legitimate wastewater user are also only usufructuary in nature.

Usufruct rights grant the use of a portion of the resource out of the total available resource. The cooperatives are entitled to wastewater dependent on its availability. There is no guarantee from RMC to continue the supply despite receiving payments from the users. All use rights granted therefore operate like riparian rights, which are usufructuary in nature.

Following the wastewater cooperatives, at least three other villages in the peripheries of Rajkot, namely Kotharia, Vajadigadh, and Nyara, have sent requests to avail wastewater from the RMC, but their claims have not been realised into use rights. In addition, 14 villages in the city's peripheries informally lift wastewater accumulated in the irrigation reservoir, the Aji River, and various natural drains that lie downstream of the city. This type of informal use is monitored neither by the RMC nor by the state's irrigation department. However, it constitutes the largest proportion of wastewater use.

DISCUSSIONS

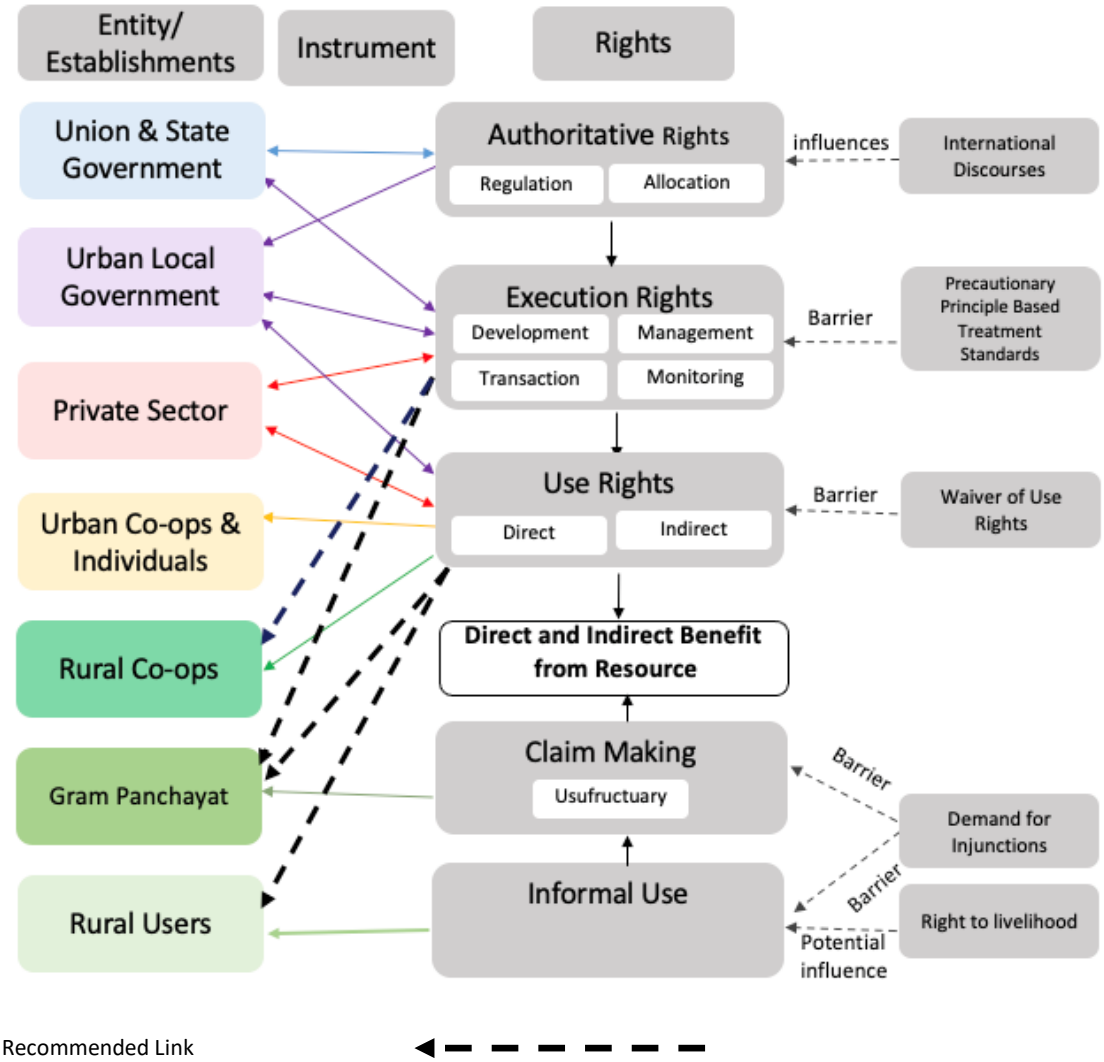
Laws and policies are ordained to define rights that outline control and ownership of resources while ensuring that environmental quality is maintained. In general parlance in the legal domain, their principal roles are defining, attributing, and sometimes allocating resources. The definition of rights is missing in the case of wastewater, even though it is widely recognised as a 'resource'. There are policies for pollution, reuse, and freshwater allocations. One of the reasons for this lack of rights to wastewater could be that sanitation-related discourses and initiatives arrived much later than laws governing the rest of the water sector and are still at a nascent stage. The instruments for sanitation emerge from bodies within the union government, such as Nirmal Bharat Abhiyan, Total Sanitation Campaign, SBM, or even missions such as JNNURM and AMRUT. Though constitutionally, and regarding execution, all the rights regarding wastewater management belong the ULBs, the state has a crucial role as a nodal agency for union government schemes and infrastructure development funds, whose proportion is increasing over time. The local bodies are materially and financially dependent on other territories, and hence their executive rights are subordinated to state and union governments.

The gaps in institutional arrangements are evident in India. Wastewater generation occurs largely in cities, while most users of wastewater are in rural agricultural environments. The union-level ministries of Rural Development and Agriculture & Farmers' Welfare are absent in wastewater governance. The urban and rural governance mechanisms are separate, and there seems to be no convergence. Along

with environmental objectives, public health protection is also an important outcome; however, the Ministry of Health is not engaging with diseases and related burdens resulting from wastewater reuse at national, state, or city levels. Existing reuse policies have mentioned a need for a special-purpose institution that could abide by environmental and health requirements and promote wastewater reuse. No such institutional change has moved beyond the drafting of policies in 2018. The policy or instrument gaps are mostly due to a lack of coordination between different institutions. Even if a policy exists, clear norms, acts, and policies between state- and union-level executive authorities, the judiciary, and the legislature are lacking, leaving the city government directionless. Many policies in the draft stage, waiting to be promulgated by a new institution or taken up by some existing institution for implementation. Treated wastewater cells, the SHPC, and the STC are some such institutions that are waiting to be formed. The non-effectiveness of the city government is not only due to delays and procedural gaps, but also in large part to a lack of coordination between different institutions.

The conceptual framework of the bundle of rights and claims, when juxtaposed with a study of the instruments and institutions relevant for wastewater use, highlights a logical disconnect in the fact that the rural agrarian sector is the largest wastewater user and yet lacks authoritative, executive, and use rights over wastewater, as is depicted in Figure 4. Through the framework, practices that are usually not noticed in the studies of resource recovery are visible.

Figure 4. Instrumental gaps linking entities and rights in Rajkot.



The findings from Rajkot suggest that the rural agrarian sector has been using wastewater long before its urban use was initiated. Wastewater use has the distinct advantage of recycling nutrients back into the soil. In addition, it is immensely beneficial to the user, so farmers continue using it. In fact, over the years, its use has increased with the increasing production of wastewater in a growing city. While ULBs are fully responsible for its reuse, they have no obligation to continue its supply to their rural counterparts, the gram panchayats, though they are major users. In contrast, the urban sector completely waives their use rights.

The practices of claim making and informal individual use face barriers in the form of injunctions emerging from public health concerns. The field study of Rajkot shows that the largest use of wastewater is by individual rural users. However, they have not made any claims on it as it contains faecal matter and the public health discourses may cause its use to be injuncted. For a user, the 'interest' in the right to realise is often influenced by the availability of complementary resources. For example, a farmer will use wastewater for irrigation if she benefits from it in a way that she cannot from any other resource. In contrast, a rightsholder such as an industry waives it. This nature of rights is termed as 'interest' or 'will' (Hart, 1983; Grönwall , 2008: 131), and it affects the execution rights of wastewater reuse; the 'will' rights lead to the probability of abandoning the wastewater reuse, leading to the unsuccessful execution of wastewater reuse projects. Unwillingness to exercise, or waiver of, use rights was found to be a barrier to ULBs who must fulfil the targets of wastewater reuse prescribed in reuse policies.

When wastewater is considered an economic good that may be transacted, it is expected that wastewater users pay for it, pointing out that the rural sector needs to pay for it to avail it. Such a policy is made so that capital-intensive wastewater treatment costs may be recovered from its users and not necessarily fully from polluters. It is to be noted that more and more fresh water is being diverted to industries and urban areas from rural and agricultural sectors. Despite the cities being hailed as economic engines, the payment for freshwater diverted to them and for treating wastewater generated by them is scant. In Rajkot's city budget for 2021, the outstanding freshwater payment was Rs 900 million; they have not been paying for bulk freshwater transfers from distant hinterlands. Thus, the rural sector is at a disadvantage as its fresh water is being diverted to cities and the resulting wastewater generated by the cities is being held there, with the cities having the authority and executive rights to decide whether wastewater will be transported to the rural areas or provided for other uses like industrial and municipal. Seeing as most wastewater generated by the cities flows back into rural areas where it is being used, the perspective on wastewater use will change if the development and management of wastewater is assigned to rural local bodies (gram panchayats) and users.

The city is responsible for wastewater within its boundaries and jurisdiction, not where it has a demand for use. If wastewater is a resource equivalent to fresh water, it is justified that it should be treated like fresh water, and its conveyance and storage should be arranged where it will be used. If wastewater is considered analogous to fresh water, there ought to be reservoirs of wastewater and canals to convey it to where it will be used. Beyond that, as in drinking water brought from dams via canals, wastewater treatment could operate at the level of rural users through development and management rights granted to rural groups and panchayats to treat the wastewater produced by the city and brought to them.

The reliable supply of Rajkot's wastewater, a redundant resource for the city, could support the livelihoods of many in its sewer-command. As the city grows, it is likely that its sewer-command will also grow with the facilitation of wastewater supply and its safe use. Thus, the city will become the catchment of wastewater for benefiting the sewer command hinterlands. The first step for this may be recognising the sewer-command as a 'wastewater recycle zone' with an intermediary to facilitate it to become safe as in other special economic zones.

CONCLUSIONS

Water is a unique resource held in public trust (Upadhyay, 2009) by the authoritative right holder. Case laws in India show that the public trust and eminent domain doctrines are applicable as per the context of the situation, so water's definition as property lacks clarity. Water is incapable of being possessed in its natural liquid state; it is a moving thing of transitory nature whose position cannot be marked (Gronwall, 2008: 247). Ownership of water is different from land ownership and other materials. Also, water is always in some part of a cycle, either circular or metabolic. It is interconnected not only territorially with its flow but also in a hydrological system, like in groundwater, and increasingly in a metabolic system with wastewater across time and space. To legally define the property rights over water and wastewater, surface water and groundwater categories are necessary but not sufficient. The legal definition of water and wastewater in natural or artificial streams, tanks, lakes, pipes, and wells, and of wastewater percolating or flowing, is required. One way to check whether water is property is to check if it can have the essential character of property, i.e. universality, exclusivity, and transferability (Coase, 2013). Because no one can hold water entirely, due to its form and nature, water defies the principle of universality. As water is a fundamental resource necessary for human survival and irreplaceable by any other substance, it is paramount to make minimum provisions for water for all human beings. Therefore, the exclusivity of the resource is not guaranteed as the transfers are necessary for survival. Transferability of water is possible but viable only when it is to be transferred in proximity by a common rightsholder. The cost of infrastructure to convey water is too high for it to be sold except in very scarce, temporary situations. As water is freely available in nature for specific periods, the temporary transferability does not lead to efficiencies.

Water is not regulated as property because it is unable to have universality, exclusivity, and transferability – characteristics necessary to become property – and for other, often political, reasons. Indian law is not inclined to ownership of water through statute. Water becomes a temporary property only when it is withdrawn from its natural state and is incapable of becoming property in its natural state. Interest in water relates not so much to quantities or volumes but to issues of who will use it and the type of use. Thus, water is conceived as a usufructuary property only when it is held.

Public trust doctrine requires space for the public in decision making, information dissemination, and accountable actions with a thorough examination of the diversion of resources to private parties (Cullet, 2012). In this spirit, emphasising wastewater use for industrial use should be scrutinised against existing usufructuary rights and usage. By way of giving the authoritative and execution rights to the urban sector alone, the idea is to change the usufructuary right to a 'property right', which could be alienated from current users by transacting with industrial users, thus fetching higher revenue.

The existing rights do not account for the inclusion of existing users, and there is a big gap in recognising them. Recognising existing users is a necessity for the rights framework. The difficulty is that the baseline of existing users is unavailable as they are not enumerated. An accounting of existing users helps not only in determining rights but also in predicting future use. The wastewater users are struggling to get recognition and inclusion in the discourse and policies of reuse and distribution of wastewater, which not only provides water value but also nutrients contained in the wastewater. Their practice indicates a sustainable relationship between environmental, economic, and technical dimensions of water-wastewater metabolism. They are invisible to policymakers concerned with wastewater reuse, and making them visible will contribute to social equity. This paper is a means to contribute to this process.

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