Performance Assessment System for Evidence-based Decision Making in Water and Sanitation Services: Implementation Experience and Lessons Learned

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Thirteen years ago, performance assessment system (PAS) programme started a journey to assess water and sanitation service (WSS) levels in two states of India covering 402 cities (population of 58 million). Now, it supports more than 1000 cities of India (population of 160 million). PAS is a benchmarking tool for monitoring WSS sectors in developing countries. It also provides better information and evidence for effective decision making. In this article, we go beyond talking about these results and discuss how PAS data are being used, for action and its impacts, on WSS in India.

Introduction

You can't manage and improve what you don't measure.

Access to water and sanitation services in urban India is widespread, but little is known about service levels and quality, and about service coverage for poor households. Lack of reliable and updated information on these services often leads to misallocation of resources. Such information gaps on service performance often result in an undue focus on building new infrastructure. New investments often fail to improve the level and quality of service. For example, water supply / sewerage infrastructure is laid down, but household connections are not provided. Similarly, sewage treatment plants are built, but a sewer network is not completed. Thus, investments in urban infrastructure in India have not always resulted in corresponding improvements in levels of service delivery.

In the year 2005, a landmark shift in urban sector in India took place with the announcement of the Jawaharlal Nehru National Urban Renewal Mission (JnNURM) and the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT). These programmes introduced the concept of reform-linked funding, and provided a much-needed focus on urban infrastructure. Projects eligible for JnNURM assistance included water supply, sewerage and solid waste management across 63 identified cities, for which around USD 6.5 billion was approved by the Government of India. But little was known about how this investment improved service levels. This problem — lack of standardised service-level data — is remarkably common in the water and sanitation

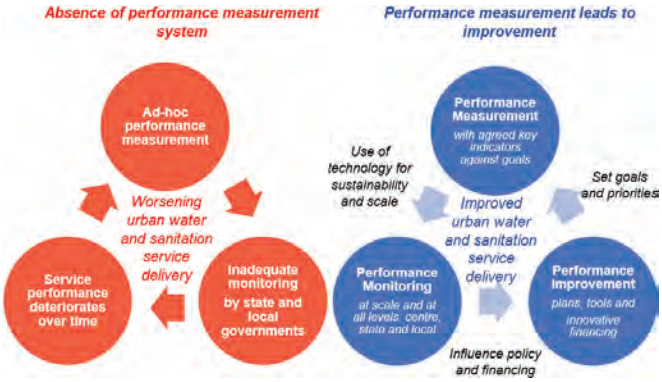
sector. But it need not be so. The PAS programme of Center for Water and Sanitation (CWAS), CRDF, CEPT University was launched in 2008 to promote innovative ways to address such information needs.

PAS programme[1] is the first benchmarking project in India, conceived to be implemented at scale. It is funded by the Bill and Melinda Gates Foundation (BMGF). The Programme was initially implemented across all cities in the two Indian states of Gujarat and Maharashtra in partnership with the state government. Both the state governments saw the PAS programme as an opportunity to build on their ongoing efforts to reform the WSS sector. The Programme was implemented in partnership with the local support partner in each state: Urban Management Center (UMC) in Gujarat (2009-2016) and All India Local-Self Government (AIILSG) in Maharashtra (2009-2018).

Initiated in 2008, the PAS programme has witnessed significant changes in government policy and programs related to urban water and sanitation at the state levels as well as at national level. The PAS programme is envisaged as a continuous process, with three key building blocks: Performance Measurement, Performance Monitoring, and Performance Improvement. See Figure 1 for the PAS programme approach.

Performance measurement is defined as development and implementation of measurement framework. Performance monitoring includes setting up appropriate systems at the state level, with annual and real-time information, detailed analysis of indicators, along with developing benchmarks and documenting good practices. Performance improvement aims to use performance indicators to prepare service-level improvement plans or tools that reach the poor and unserved, and increase financial viability.

Figure 1
Approach of Performance Assessment System



The performance assessment system was conceived after a review of benchmarking experience in urban water and sanitation in the past in India and around the world, and an examination of their applicability in the Indian context. The PAS was conceived to move away from an asset-creation focus to a system to promote the use of performance information for more efficient, equitable and sustainable WSS services in India. Systems, processes and methodologies under the PAS programme were designed to address the lack of time-series performance information, and to promote use of performance information for decision making and to ensure sustainability.

PAS Programme Inception Stage

Worked at the grassroot level and co-designed with the city, state and national governments to align the information collection, analysis and use in the government systems.

In the early years, the PAS programme was more focused on background studies, development of frameworks, methods and tools for performance measurement and monitoring. The ***performance measurement framework*** of the PAS programme has constantly adapted, evolved and improved over time as per the emerging priorities. Its initial design was based on an extensive review of previous benchmarking efforts, both global and Indian.

1 More information about Performance Assessment System (PAS) is available at ***www.pas.org.in***

Noteworthy among them are: (a) the International Benchmarking Network for Water and Sanitation Utilities (IBNET)[2], American Water Works Association (AWWA) and the International Water Association (IWA)[3], globally and (b) a few efforts in India to measure performance for WSS in selected cities in the past[4]. The key lessons that emerged from the review of these initiatives were: (a) adequate time is required to set up robust performance assessment systems, which may range from 5 to 10 years; (b) systems once fully set up can be used for both outcome monitoring and making rational investment decisions; (c) support and funding is required in the initial period to agree on and set up systems; (d) a consultative process is required to achieve broad agreement on approach and implementation at national and sub-national levels; and (e) government ownership and regular reviews are essential to the process.

All above lessons are reflected in the design and development of the performance measurement framework for PAS. Initially, simple Excel based checklists were developed for data collection. In 2008-09, pilot studies were conducted in 32 urban local bodies across the states of Gujarat and Maharashtra to test the checklists. The selection of cities for pilot tests was done in consultation with the respective state governments. The PAS team had detailed discussions with a range of actors from decision makers to service operators in these cities, including mayors/presidents, commissioners/chief executive officers, city engineers, technical supervisors and other key service operators. Detailed studies were conducted to understand the data recording practices, availability of information for various service delivery aspects and flow of information within city governments and city-to-state-governments. These processes helped to contextualise the PAS framework per the local systems for water supply and sanitation service delivery.

The pilot studies highlighted a range of issues across the cities and states. They included a lack of technical personnel in cities; poor understanding of required information; ambiguous definitions, particularly for properties and households; differing spatial divisions for water and sanitation; inconsistencies in maintenance of household records and ward-level records; poor synchronization between data collection and data entry systems; non-availability of information; no justification for assumed data; and lack of financial audits. Officials from the state governments of Gujarat and Maharashtra and the pilot cities were conferred with, and detailed checklists prepared for data collection. Thus, the process of performance measurement framework development has been consultative, involving exchange of ideas and engagement with state agencies, cities officials, sector experts and resource persons.

A revised framework was subsequently used for a statewide roll out, covering all cities of Gujarat (166 cities) and Maharashtra (248 cities). In initial years, information was collected and validated through field visits to all cities. During field visits, the PAS team spent 2 to 3 days working with city officials to dig up data from the hard copies, collating from various records maintained at site locations and suggesting methods to city officials to make estimates where data was not available. While these efforts made the process of data analysis, validation and monitoring cumbersome, they also created ownership of the performance assessment data and process, and built the city officials' knowledge of the assessment framework, its data requirements and its use for

2 The IBNET platform enables comparison of utility performance across cities and countries, based on a set of indictors and toolkits for data collection and measurement. Details of IBNET are available on its website (***www.ib-net.org***).

3 IBNET and IWA provide ready-to-use templates and a web platform for data collection, analysis and dissemination of results.

4 Water and Sanitation Program (WSP) funded report by CRISIL Infrastructure Advisory Services on Phase II Benchmarking of UWSS (2003-04): this study was done for 10 cities. Ministry of Urban Development in Government of India and Asian Development Bank's Benchmarking of Water Utilities (2007): this study was for 20 Indian cities. CMAG's (City Managers Association of Gujarat) 'Urban indicators and performance measurement' funded by USAID and WBI for Gujarat (2000): this initiative was for 10 cities. National Institute of Urban Affairs Study sponsored by CPHEEO (1999-2000) to determine the status of water supply, sanitation and solid waste management services in 300 Class I towns and cities in India.

evidence-based decision making. City officials' mindset was shifted away from a reporting and compliance culture to understanding the value and use of data. For example, many cities co-prepared a water and sanitation network map with the help of the PAS team and used it for multiple activities, including expansion of WSS services in unserved areas. These officials started to understand their results and compared their performance with their peer groups.

In 2009, the Ministry of Urban Development, Government of India (GoI) launched the standardized service level benchmarks (SLBs) to measure WSS service performance spanning four sectors: water supply, wastewater, solid waste management and storm water drainage. The SLB initiative focused on collation of standardized indicators; implementation of Management Information Systems (MIS) at the city and state level; and development of Performance Improvement Plans (PIPs), addressing the need for both internal monitoring for decision making and reporting to higher levels of government. From the outset, the PAS team became part of the GoI's SLB initiative and carried out benchmarking exercises in four of the 28 pilot cities selected by GoI.

At the end of this pilot exercise, it was decided that instead of creating a different performance measurement framework, the PAS measurement framework should be aligned with the Government of India's service-level benchmarks (SLB) framework. However, in addition to SLB indicators, PAS also included equity and onsite sanitation indicators and various local action indicators that were missing in GoI's framework. In urban India, about 20% of the population reside in slum areas. It was deemed important that an assessment of access to water and sanitation in slum areas must be included while assessing equity in service delivery. In sanitation, the SLB framework of the GoI captures performance of only cities that have sewerage system. Since the majority of Indian cities depend on onsite sanitation, the PAS framework revised the sanitation indicators as ***San-Benchmarks*** to capture the reality of more widely prevalent sanitation systems in Indian cities. The PAS measurement framework is applicable for developing countries where the proportion of the population living in slum areas is high, and where cities depend on on-site sanitation systems.

In the year 2012, an online system was developed and deployed on the PAS portal, ***https://www.pas.org.in/*** for systematic collection and analysis of WSS data. The portal is a web-based platform for data storage, validation and processing. It enables data entry, inbuilt validation generating state and city analysis reports, and provides open access to the results, which are in public domain.

A comprehensive set of guidelines was prepared, and through a series of capacity-building workshops, government officials were trained and made conversant with the online data entry tool. Subsequently, officials have started entering data online on their own, with the PAS team providing constant support for resolving data issues. This has resulted in a significant reduction in time for the annual performance assessment activity, from 15 months to two months over a period of five years. The development and maintenance of this online portal is under an industry-academic partnership with Tata Consultancy Services (TCS), a premier information technology company with operations across India and globally. Cloud-based applications provide cities with more flexible options, enabling them to make better use of performance data, enabling rapid data collection and measuring while communicating progress along the way.

Replication

Financial incentives linked to the publication of service-level benchmarks has helped sustain and replicate the PAS system

The use of PAS received a boost with the Thirteenth Finance Commission's (FC) recommendation to introduce a performance grant for financial years 2011-15. The performance grant (which is 20% of a block grant) was to be given if state governments fulfil a set of conditions, one of which was to assess and publish service levels and targets. The 13th FC stated that, "State governments must put in place standards for delivery of essential services provided by the local

bodies for four services viz. water supply, sewerage, solid waste management and storm water drains on the lines of Handbook for SLB by MoUD". This marked the beginning of a mindset shift from "infrastructure investments" to "service delivery outcome," which has always been at the core of PAS' philosophy. Since 2011, information from PAS has been used by local governments to avail performance grants. Total performance grants for all urban local bodies (ULBs / cities) in India was estimated to be about USD 1.8 billion from 2011-12 to 2014-15.

To meet the requirements of the 13th FC performance grants, a formal process of setting up SLB cells was adopted in each state of the PAS' operation. Government resolutions were issued by the respective state governments regarding the formation of SLB cells, and their terms of reference and responsibilities were defined. The calendar of activities of each SLB cell was defined, with timelines for activities such as online data entry by cities, SLB data analysis and dissemination, capacity building, and support for city-level improvement plans (city level consultations, preparation of Information System Improvement Plans and Performance Improvement Plans).

In2014, in line with the 13th FC recommendation, MoHUA recommended that all state urban development departments strengthen the process of monitoring SLBs at the state and city level. In addition, MoHUA endorsed the efforts of the PAS programme and cited the project's achievements in Gujarat and Maharashtra. MoHUA appointed CEPT as its national technical support partner for capacity building of states/cities to operationalize the SLB process in line with the 13th FC recommendations. PAS influenced the MoHUA's decision to form SLB cells at the state level. As a result, many state governments created state cells. The PAS online module was endorsed by the MoHUA, and it was recommended that other state governments use this online module for benchmarking WSS. As a national technical support partner, CEPT had shared knowledge, tools and experiences with other states that were planning to initiate service- level benchmarking in WSS.

The PAS team also advocated to the 14th and 15th ***Finance Commission*** to continue performance based grants linked to notification and improvement in water and sanitation service delivery. Both commissions have accepted this recommendation. The 14th FC (2015-20) identified measurement and publication of service-level benchmarks as one the conditions to avail performance-based grants of about USD 3 billion. This provided an opportunity to strengthen and scale up the online performance assessment (SLB-PAS) module developed under the PAS programme. The 15th FC (2021-26) has continued the practice of linking performance grants with publication and improvement of service-level benchmarks for all of the major cities of India. Progressive performance grant conditions linked with financial incentives have encouraged cities to assess and improve performance of water and sanitation service levels periodically.

The financial incentive linked with the publication of service-level benchmarks has helped sustain and replicate the PAS system. Besides Gujarat and Maharashtra, where a PAS team has been working for the past 11 years, four other states and the Smart Cities Mission of the Government of India have used the online system for performance assessment. Cities in the state of Chhattisgarh have been using the system since 2015 and in Jharkhand since 2016. Telangana cities used the PAS system from 2016 to 2019 for SLB publication. In 2016, the PAS team also provided technical support to the cities of Assam state for data validation and report generation using the SLB-PAS online module. In 2020, under the guidance of Smart City Mission, MoHUA, cities used the online PAS module for assessment of water and sanitation services.

Since 2017, the states of Chhattisgarh and Jharkhand have institutionalised the SLB-PAS module and used their own funds to hire local consultants to support the use of the online SLB-PAS module by cities. This demonstrates ownership by these state governments for use of the PAS-SLB portal for their performance-monitoring activities.

To streamline adoption of PAS in the Smart Cities Mission, PAS was linked to MoHUA's Assessment and Monitoring Platform for Liveable, Inclusive and Future-ready India (***AMPLIFI***) portal. AMPLIFI serves as a repository of data derived from various assessment frameworks carried out by the Smart City Mission year-round and for other data collected by cities. Based on the use of PAS by smart cities, a water and sanitation dashboard has been prepared and uploaded on the AMPLIFI portal.

CWAS is exploring using the PAS-SLB module's links with the ***City Finance portal*** created for 15th FC grant compliance. Based on experience with 1,000 cities, the online PAS-SLB module has been further simplified for use by all 4,000+ cities across India.

Capacity building of state and city officials is a vital activity for replication and sustenance of PAS. The PAS team has conducted more than 50 capacity-building workshops and trained more than 3,000 government officials for assessment and improvement of water and sanitation services. These workshops were conducted in partnership with the respective state governments. In the initial years, trainings were conducted at the regional level in small batches to make sessions interactive. Later, trainings were organised for specific groups, such as newly formed cities.

With Covid-19, learning and knowledge sharing has been transformed through online training. City officials are also undergoing a radical transformation driven by the need for digital administration. Since 2020, CWAS has conducted several online trainings and meetings in various states and smart cities of India.

Performance Measurement to Improvement

Rethinking the investment approach: From infrastructure creation to improving service levels in water and sanitation

The PAS programme has helped create a culture of performance assessment. This is a long-term process as interest and confidence in information gradually gets built when used for performance improvement. Performance improvement is not only about capital investments, but also involves policy advocacy and process changes. The PAS system has been used by states and cities with diverse geography and varied levels of development. Information provided by these cities is used for policy development at the state level and for the preparation of improvement plans at the city level. PAS information and tools have been extensively used by a wide range of stakeholders, even beyond the states where PAS has been used regularly.

Various ***decision support tools*** have been created to facilitate preparation of improvement/investment plans at state and city levels. These tools have been widely disseminated in various national and international workshops. These tools include SaniPlan, SaniTab, IFSM toolkit, private sector participation (PSP) tools, and the Target Setting Model and Tariff Setting Model. These tools emphasize and promote use of performance assessment information for evidence-based decision making for improved service levels. For example, SaniPlan was developed to link performance improved options with financing options. It identifies water and sanitation improvement actions, simulates their impact on service levels, reviews financing options and assesses their impact on local finances. For example, many cities aspire for a sewerage system, but looking at the state of their municipal finances, they cannot afford regular operation and maintenance expenditures, even if they receive grants for capital expenditure. Hence. cities need to think of low-cost options, like fecal sludge and septage management (FSSM), that provide similar service-level outcomes. The SaniPlan tool (SaniPlan-FSM) is customised to prepare an integrated fecal sludge management plan (IFSM). The ***IFSM toolkit*** was developed for citywide assessment of key areas that need to be studied for developing the IFSM plan.

The PAS programme operates at state and local levels. It provides insights into challenges and improvements necessary in urban water and sanitation systems. The PAS team has developed several policy guidelines and standard operating procedures for improving WSS services. At the national level, the PAS programme made contributions in developing SAN-Benchmark, which incorporates on-site sanitation. The PAS team

also prepared various standard operating procedures (SoPs) for fecal sludge management (FSM), water quality surveillance, customer grievance redressal and waste stabilization ponds. The SoP for FSM was included in a government regulation issued by the Government of Gujarat (GoG) for making cities open-defecation free.

Linking performance assessment to improvement is helping sustain the interest of cities. Based on the performance assessment of Gujarat and Maharashtra, ***better performing cities*** were identified and their practices documented. These cities have served as "resource cities," and PAS has facilitated peer-to-peer learning through exchange visits. To demonstrate the use of performance indicators for improvement, PAS provided technical assistance to over 35 cities for improvement plans. Rather than infrastructure creation plans, the PAS plans focused on improvement of service levels in areas such as water-loss measurements and reduction, open defecation free cities, ***septage management***, consumer grievance redressal, cost recovery and information system improvements. Plans provided both short-term (low-cost) and medium-term (capital-intensive) options. The plans were prepared on the basis of city-level assessment through analysis of PAS information and local consultations.

The PAS programme has been flexible and explored several themes for performance improvements that are linked to state govesrnment goals and targets. In Maharashtra, the theme for ***Open Defecation Free (ODF) cities*** and ***24x7 water supply*** was integrated in an improvement planning exercise for 15 cities. This has helped draw interest from state government and allow periodic review of improvement plans by state officials. (See Box 1).

BOX 1

Example of evidence-based decision making: Pioneering work in the sanitation space – case study of moving cities ODF++ in Maharashtra

The PAS team provided support to 15 Class A cities (population ranges from 100,000 to 300,000) in the state of Maharashtra for preparation of performance improvement plans (PIP) . These plans focused on implementing 24x7 water supply and achieving open defecation free (ODF) status in the cities. Proposals for ODF cities were prepared with clear funding requirements, institutional responsibilities of management, community awareness, and mobilization and phasing. Options related to individual versus community toilets were explored, and the nature of awareness generation and mobilization for monitoring ODF localities were outlined.

Based on learnings from the PIP exercise, support was provided to cities that were willing to commit their own resources to make their cities ODF. The PAS program had also provided support to the towns of Wai and Sinnar to achieve universal access to toilets and appropriate septage management. The program also documented Mahad and Satara good practices to achieve ODF city status. These studies and support to the cities took place prior to the launch of Swachh Bharat Mission (SBM) by the Government of India. Experiences and learnings from the city-level efforts were distilled for preparation of the strategy to achieve OPD Maharashtra under the ***Swachh Maharashtra Mission for Urban Areas*** (SMMUA). The PAS Program, CEPT University provided support to the Government of Maharashtra (GoM) for implementation of the Swachh Maharashtra Mission in the state through June 2016. Since then, technical support has been provided to GoM through a separate grant funded from the BMGF. As a technical support partner to GoM for sanitation, various activities were carried out at the state level on policy documents and guidance materials. At the local level, the GoM supported cities in their efforts to become ODF.

GoM initiated the journey of becoming ODF and Swachh (cleanliness) by launching the "Swachh Maharashtra Mission, Urban" (SMMU) on 15th May, 2015, under the aegis of the GoI's Swachh Bharat Mission. GoM envisaged "ODF

Communities" moving towards "ODF+ and ODF++ Communities" by addressing the entire service chain of sanitation rather than focusing only on the number of toilets constructed in the cities. A systematic approach was adopted by keeping the city in view as a unit, and encouraging city managers to move towards improved sanitation by prioritizing access and use of their own toilets and implementing plans for safe management of fecal waste. This experience of Maharashtra was instrumental in developing the ODF and ODF+ framework at the national level.

The PAS database was used to identify the gaps in access to toilets and for situational analysis of fecal waste management in cities. Accordingly, the state prepared strategies to achieve ODF and then encouraged cities to move towards ODF++ status. Quarterly targets were set so that urban Maharashtra could achieve ODF status by 2nd October, 2017. Cities with lower gaps in access to toilets were low-hanging fruit and were the first ones targeted to achieve ODF status. The SMMUA achieved the first milestone when the chief minister declared 19 cities in Maharashtra ODF on 2nd December 2015. The PAS team documented the success stories of these cities and their efforts toward becoming ODF.

Urban Maharashtra was declared ODF in October 2017. Cities are now moving towards "ODF++" status by providing safe transportation and treatment of fecal sludge and septage. PAS data related to the management of sewage and fecal sludge and septage were used to prepare strategies for safe transportation and treatment of sewage and fecal sludge. Based on PAS information, the Government of Maharashtra passed a resolution for co-treatment of fecal sludge and septage at nearby STPs or setting up an independent fecal sludge and septage treatment plant in their city based on a prototype design.

The program has been a pioneer and a transformation driver in the sanitation space, with over 170 functional FSTPs constructed in one year, despite the Covid-19 pandemic.

In Gujarat, PAS lobbied for and created new opportunities for water audits that were carried out for the first time across 10 cities. These audits have helped raise greater awareness about data issues and the importance of ensuring efficient management of water resources. Based on these studies, cities have undertaken a range of improvement measures to reduce non-revenue water (NRW). (See Box 2).

BOX 2

Example of results of action research: Reduction of Non-revenue water – case study of Rajkot city, Gujarat, India

With a large part of the state in a arid and semi-arid region, Gujarat has severe water security issues. Many cities in Gujarat face serious water shortages, especially in the summer season. With Narmada water being made available to many cities through a system of canal network in Gujarat, a drinking water crisis has been averted. However, it is important that cities and consumers recognize that water is a precious resource that needs to be delivered efficiently and used effectively. PAS results suggested that Gujarat cities did not have proper information related to quantity of water produced and the quantity of water that reached the consumer. This was mainly because of the lack of metering at various stages of water supply systems, sources, treatment plants, distribution stations and at the consumer end. Recognizing this, the state government requested CEPT to carry out water audit studies in pilot cities of Gujarat.

Rajkot with population of 1.28 million was one a pilot city for preliminary water audit studies. The city is located in peninsular Saurashtra, a rocky region with very low recharge levels and scarce sources of water. The water supply department of Rajkot Municipal Corporation (RMC) is constantly trying to provide enough water to citizens but faces complaints of unequitable water distribution. The city supplies water every day for only 20 to 30 minutes. Around 260 MLD of water is extracted from six different sources,

treated in five treatment plants and distributed through 17 water distribution systems. There was no monitoring system to record quantities of water extracted, treated or distributed and no accountability for water loss.

A preliminary water audit study of Rajkot Municipal Corporation conducted by the PAS team indicated high losses in water supply transmission lines. Subsequently, the RMC installed a real-time water loss monitoring systems in transmission lines to monitor and reduce water losses. This system continuously monitors water levels in dams, ground-level storage reservoirs and elevated storage reservoirs using ultrasonic water level sensors and a full-bore electromagnetic flow meter for inlet/outlet flow. The RMC spent USD 600,000 for the installation and five-year maintenance of the system. The flow meters and water level sensors provide cumulative flow, daily flow and water balance statements for the city.

With the help of the real-time information, the quantity of water produced and distributed is calculated accurately. After installing this system, it was found that the city had many illegal connections and leakages in water supply pipelines. City officials disconnected the illegal connections and replaced the leaking pipelines, reducing water losses significantly.

Besides water quantity measurement, the system also records and stores data for distribution chain optimization and sends alarm SMS messages in case of an emergency. This enables city officials to respond to complaints 24X7. The water distribution system can also be accessed through off-site computers and Android phones. The broad benefits the city has observed after implementing this system are:

- reduction in water losses in transmission lines;
- real-time online monitoring made possible by online data availability;
- greater accountability and responsibility for city officials;
- more informative and responsive zonal offices, which help resolve water-related conflicts or misunderstandings among citizens especially during peak demand in summer;
- rapid attention to problems enabled by the alarm facility; and
- monitoring and rectification of any deviation from the standard parameters.

The case study of preliminary water audit in Rajkot successfully demonstrates the results of action, research and continuous engagement with cities, which distinguishes the PAS programme's work.

In addition to government officials, PAS information has been used by regulators, financial institutions, consultants, researchers and academicians. Regulators, such as the Comptroller and Auditor General of India (CAG), have used PAS information to conduct performance audits of urban local bodies for selected cities in Maharashtra. CAG in Gujarat, Chhattisgarh, Jharkhand and Telangana assess their regulatory compliance using PAS data. Multi-lateral financing institutions, such as the Asian Development Bank and the World Bank, have used PAS data for project identification, selection and formulation.

Consulting firms and individual consultants have used PAS data for consulting assignments, such as preparing vision documents and city development plans. PAS data is regularly used by researchers, including academicians and students from planning and technology colleges. Forty research reports have been prepared at CEPT University using PAS information.

Way Forward

Still a long way to go despite significant progress

The online tool is central to PAS' approach to moving to a virtuous cycle, from measurement and monitoring of performance to reward and learning from success and demonstrating results. The entire

process of developing a performance assessment and monitoring system has been consultative, with active involvement of state and local stakeholders. Information collection, analysis and use is aligned with city and state government systems and needs identified by the stakeholders. The PAS framework has focused on the "real" context for benchmarking WSS in the developing country context, and includes indicators on equity and on-site sanitation systems. The framework has demonstrated the benefits of working at scale at the state level, covering all cities. The data collection process has shifted from city visits to central camps to spreadsheets to online modules, and the time required for data collection has been significantly reduced. Currently, PAS has city-level performance data and assessment based on information provided by city/service providers across nearly 1,000 cities. PAS has also conducted large-scale capacity building of state and local government staff for performance assessment and improvement of WSS.

PAS has emphasized and promoted the use of performance assessment information for performance improvement or improved service delivery. Policy advocacy at the national and state level was instrumental in SLB-PAS's endorsement by MoHUA and recognition of its applicability to the 13th and 14th finance commissions' recommendations related to performance-based grants for urban local bodies. The 15th Finance Commission has also mandated publication of service-level benchmarks and grants linked to performance.

As PAS is linked with the government system and is used by city, state and national governments, it can be strengthened by citizen perspective. Citizen feedback on service levels can enable governments/ service providers to improve performance. To capture this, CWAS is now exploring creation of an ecosystem to include citizen perspective and assess intra-city variations. It is expected that based on this effort, service providers will allocate appropriate financial, human and material resources for the right measures at the right urban locations.

Most benchmarking efforts globally depend on information provided by service providers. We believe that in low- and middle-income countries (LMIC) – where intermittent supply is predominant, connections are not metered and the majority of consumers are poor – "demand-side" information is important. We intend to demonstrate how this demand-side information can be integrated with supply-side information for a better , more robust and more effective performance-assessment system for water and sanitation.

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Stanford's Program on Water, Health and Development is working to improve the health and well-being of communities by creating the knowledge, skills and solutions needed to support effective management of water and wastes, and to ensure sustained, equitable access to water supply and sanitation services.

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