TECHNICAL NOTE 1

From Infrastructure to Impact: Why Behaviour is the Critical Variable in Water Projects

Real-Time Evaluation of the Water Supply Improvement Project (WSIP) in Guyana – Caribbean Development Bank

From Infrastructure Delivery to Behavioural Impact

Water infrastructure projects are typically assessed through their **physical outputs:** treatment plants commissioned, networks expanded, storage capacity increased, and water quality standards achieved. These outputs are essential. However, early evidence emerging from the Real-Time Evaluation (RTE) of the Water Supply Improvement Project (WSIP) in Guyana indicates that **infrastructure delivery alone does not ensure development impact.** [1]

The decisive transition—from improved supply to improved well-being—occurs through user behaviour. Whether households trust the service, accept it as safe, and use it consistently determines whether public investment translates into health gains, reduced household costs, and long-term system sustainability. Infrastructure creates the potential for improved services, but behaviour determines whether that potential becomes actual use and welfare improvement.

Why Behaviour Determines Development Impact

Early findings from the WSIP RTE suggest that even when water meets technical and regulatory standards, some households may continue relying on bottled water or other sources. This pattern reflects not engineering failure but a **gap between technical quality and perceived safety.** Past experiences with service reliability, early operational disruptions, and limited visibility of quality assurance mechanisms shape how communities interpret the new service.

Behavioural uptake is therefore not an automatic consequence of infrastructure provision. It is a causal mechanism that must be actively managed. When behavioural dynamics are addressed late—through end-of-project surveys or communication campaigns—the cost of change is higher and the probability of success lower. Early perceptions tend to stabilise quickly and shape long-term habits.

Conversely, integrating behavioural considerations early in implementation—through clear communication, expectation management, and real-time learning—can significantly strengthen the likelihood that **infrastructure investments translate into sustained service use and development outcomes.**

The Strategic Role—and Limits—of Real-Time Evaluation and Theory-Based MEAL

A **RTE** is an evaluation conducted during project implementation to **generate timely evidence that supports**

1 Real-time evaluation and theory-based MEAL expand traditional evaluation functions and may test institutional capacity to absorb and act on findings. They are best suited to complex interventions involving behavioural or institutional dynamics. These approaches require additional skills, sustained management engagement, and trade-offs with conventional evaluations, including lower standardisation and limited ex post comparability.

adaptive management and informed decision-making. Within WSIP, the RTE illustrates how real-time learning can help identify emerging risks and opportunities while outcomes remain malleable.

Combined with a theory-based Monitoring, Evaluation, Accountability, and Learning (MEAL) system, the RTE shifts attention from static compliance indicators to what may be described as **"living evidence."** This approach allows project teams and decision-makers to act on early signals and adjust implementation strategies before behavioural patterns consolidate.

At the same time, real-time evaluation expands the scope of what evaluation is expected to do. It may test institutional capacity to absorb findings and translate them into operational decisions. Such approaches are therefore most suitable for complex interventions where outcomes depend on behavioural dynamics, institutional coordination, or governance conditions.

They also involve trade-offs. Compared with conventional ex-post evaluations, real-time approaches may offer less standardisation and limited comparability across projects. They require additional analytical capacity, sustained management engagement, and closer interaction between evaluation and operations. **Recognising these costs and trade-offs is essential to ensure that real-time evaluation is adopted selectively and aligned with existing governance and accountability systems.**

Infrastructure and Behaviour as One Delivery System

Infrastructure and behaviour are often treated as separate domains within water projects: one technical and measurable, the other social and less tangible. The WSIP RTE suggests that this separation is misleading. **Infrastructure and behaviour together form a single delivery system.**

Infrastructure provides the physical capacity for improved service delivery. Behaviour determines whether that capacity translates into trust, consistent use, and welfare gains. A project that focuses exclusively on physical assets without addressing behavioural uptake remains incomplete.

Behavioural dynamics begin well before the infrastructure becomes fully operational. Decisions made during design, construction, commissioning, and early operation shape how users experience and interpret the service. Water that meets technical standards but is not perceived as safe or reliable may still fail to achieve adoption.

Conversely, infrastructure introduced alongside **deliberate trust-building measures—clear communication, credible quality assurance, and responsive service management—**is far more likely to be adopted and sustained over time. In many cases, what appears to be a "behavioural challenge" is in fact a systems integration issue: fragmented communication, early operational disruptions, or weak visibility of quality assurance mechanisms can undermine trust even when infrastructure performs as intended.

From this perspective, project success should not be measured solely by asset commissioning but by **the extent to which users incorporate the service into their daily practices with confidence.**

Evidence from WSIP: Early Signals and Their Meaning

The RTE has identified **several early signals** that provide insight into how behavioural mechanisms may evolve as the new infrastructure comes into operation. Initial feedback suggests that even where water quality improvements are acknowledged, some households may initially maintain precautionary behaviours, including continued reliance on bottled water, until confidence is firmly established.

Patterns of trial use indicate openness to adoption, but also highlight the importance of **how early service experiences are communicated and managed.** Preliminary feedback from communities emphasises the importance of clear explanations regarding water safety, quality control processes, and the institutional mechanisms that ensure service reliability.

These signals should not be interpreted as failures. Rather, they function as early warnings that the transition from infrastructure outputs to behavioural outcomes requires **active management.** The advantage of real-time evaluation is that it identifies these dynamics while there is still time to respond.

Ignoring behavioural mechanisms until late in the project cycle exposes investments to several risks. Early mistrust can become entrenched even after technical issues are resolved. Households may continue to incur unnecessary costs through bottled water purchases, undermining af-

These dynamics have implications beyond individual projects. Behavioural underperformance can undermine institutional credibility, reduce public willingness to support tariff reforms, and weaken confidence in future water-sector investments.

fordability objectives. Aggregate indicators may also conceal uneven adoption patterns across communities.

Protecting Impact Through Sequencing, Communication, and Learning

Viewing infrastructure and behaviour as a unified delivery system has direct implications for **project sequencing, communication strategies, and management practices.** Evidence from WSIP suggests that **early investments in communication, readiness, and real-time learning can significantly protect project impact.**

Commissioning should therefore be understood as both a technical and social transition. Communities need clear information about what "safe water" means, what to expect during early operation, and how service providers will respond to operational issues. When expectations are managed proactively, early adoption is stronger and tolerance for minor operational disruptions increases.

Communication also plays a central operational role. Making water quality visible through credible signals, explaining service interruptions before they occur, and ensuring consistent messaging across technical and social teams are essential elements of service delivery. For utilities such as Guyana Water Incorporated (GWI), this implies **integrating communication and community engagement into the core operational strategy.**

Real-time evaluation and adaptive MEAL systems support this approach by enabling timely course correction. By identifying emerging risks and opportunities early, decision-makers can intervene while behavioural patterns remain flexible rather than relying on ex-post evaluations that diagnose problems after they have already become entrenched.

The benefits of addressing behavioural dynamics during implementation extend across different levels of the system:

- For utility managers, a service that is **trusted and consistently used** reduces complaints, stabilises demand, and strengthens institutional credibility. Over time, this credibility facilitates tariff discussions, cost recovery strategies, and long-term investment planning.

- For national policymakers, infrastructure projects that **achieve high adoption deliver better value for money.** Public investment translates into measurable welfare gains rather than underutilised assets. Reduced reliance on bottled water lowers household expenditures and environmental impacts while supporting affordability and sustainability objectives.

- From a fiscal and policy perspective, integrating behavioural considerations into project sequencing, communication, and monitoring **reduces the risk that infrastructure investments fail to achieve their intended social and economic returns.**

Infrastructure creates the conditions for improved services; behaviour determines whether those services deliver real impact. The WSIP RTE highlights the importance of addressing behavioural mechanisms from the earliest stages of implementation to ensure that engineering achievements translate into sustained improvements in people's lives.

This Technical Note is part of the deliverables of the Real-Time Evaluation (RTE) of the Water Supply Improvement Project (WSIP), that was conducted by the Office of Independent Evaluation (OIE) of the Caribbean Development Bank (CDB), through the collaboration with two consultancy firms: Technopolis Group, and Integrated Sanitation Solutions for Urban Development (I-San).