Safe WATER NETWORK

MAY 2020

IMPROVING THE PERFORMANCE OF DECENTRALIZED WATER PURIFICATION SYSTEMS

AN OVERVIEW OF SAFE WATER NETWORK'S TECHNICAL ASSISTANCE AND TRAINING PROGRAM WITH THE GOVERNMENT OF KARNATAKA, INDIA—COVERING 18,000 PLANTS AND SERVING 40 MILLION PEOPLE.
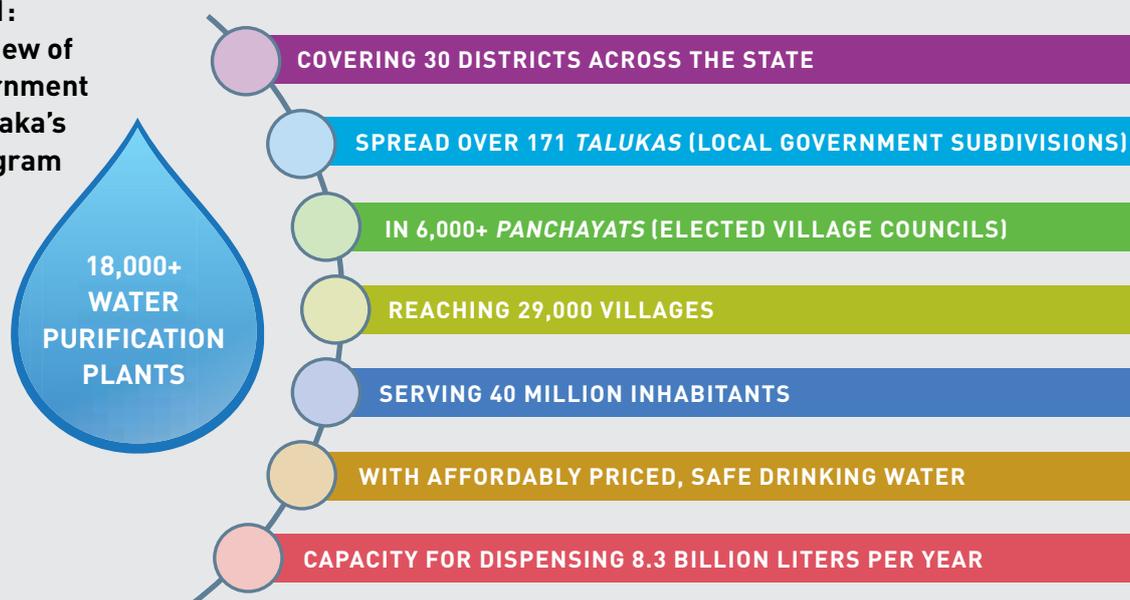

BACKGROUND

With more than 2 billion people around the world lacking access to safe drinking water, there is an enormous need for reliable, cost-effective approaches for making safe water available and affordable, particularly in underserved rural and peri-urban communities.

The government of the State of Karnataka in India has recognized this need, and over the past eight years has invested significant resources in a decentralized system of 18,000 water purification plants (WPPs) across 30 districts of the state, with the aim of serving more than 40 million of its inhabitants (see Exhibit 1). The system is one of the largest of its kind in the world. Individual plants have been run by local village councils *(Panchayats)*, cooperatives, self-help groups, and other local agencies, selling water at an affordable (now standardized) price of 5 rupees, or about 0.07 USD for 20 liters.

EXHIBIT 1:
An Overview of the Government of Karnataka's WPP Program

18,000+ WATER PURIFICATION PLANTS

- **COVERING 30 DISTRICTS ACROSS THE STATE**
- **SPREAD OVER 171 *TALUKAS* (LOCAL GOVERNMENT SUBDIVISIONS)**
- **IN 6,000+ *PANCHAYATS* (ELECTED VILLAGE COUNCILS)**
- **REACHING 29,000 VILLAGES**
- **SERVING 40 MILLION INHABITANTS**
- **WITH AFFORDABLY PRICED, SAFE DRINKING WATER**
- **CAPACITY FOR DISPENSING 8.3 BILLION LITERS PER YEAR**

Over time, however, different plant designs, operating models, and maintenance schemes have resulted in varying service levels, functional breakdowns, and disruptions of service in some locations (see Exhibit 2). To address this situation, the state's Rural Drinking Water Supply & Sanitation Department (RDWS&SD) initiated a program in early 2019 to upgrade and enhance the performance and service provision of the Karnataka WPP system.

EXHIBIT 2: Challenges Faced by the WPP System

- **Variation in:**
  - **Operating agencies**
  - **Operating models**
  - **Pricing and financial metrics**
  - **Plant design and capacity**
- **Repairs and maintenance**
- **Capability of field staff**
- **Complaint management**
- **Monitoring and evaluation**
- **Quality tracking and reporting**
- **IEC impact**

SAFE WATER NETWORK'S ENGAGEMENT WITH THE GOVERNMENT OF KARNATAKA

The RDWS&SD is aware of Safe Water Network's expertise in designing, operating, and maintaining decentralized water systems (with more than 400 small water enterprises in India and elsewhere, providing access to more than 1.5 million people), and has engaged Safe Water Network Water Solutions (SWNWS) to assist it in this important multi-year program. We have been working together since the program's outset, with the target of ensuring reliable and sustainable provision of safe water to all communities within the WPP service area.

# SAFE WATER NETWORK TECHNICAL ASSISTANCE AND TRAINING WORK STREAMS

Safe Water Network's technical assistance and training activities in support of the government program are being carried out in two phases.

PHASE 1.

The first phase of work involved initial audits of several hundred plants, the specification of service levels and operating standards, and the development of a sustainable pricing/financial model for all stations. This has been followed by procurement and contracting of professional operating and maintenance services for upgrading station performance. Thus far, operations and maintenance (O&M) contracts have been entered into for more than 7,000 water purification plants, with service now being restored and O&M improvements underway at many locations.

Based on the success of Phase 1, SWNWS's engagement has been extended into a second phase of work over three years, involving a comprehensive 360-degree approach to improving overall performance and community benefits across the entire WPP system (see Exhibit 3).

EXHIBIT 3: The Safe Water Network Engagement's 360-degree Work Streams
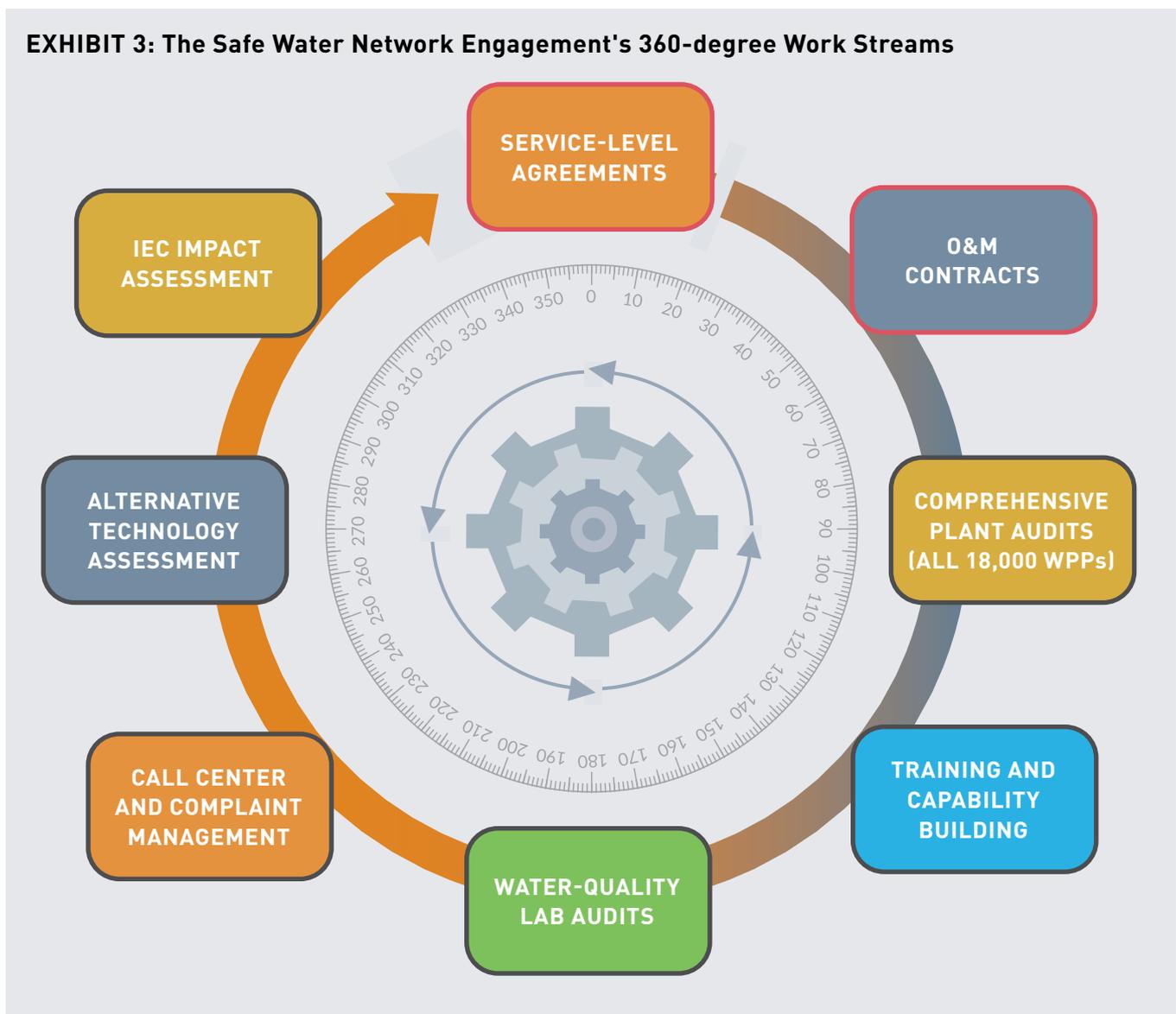
PHASE 2:

The six main work streams that fall under Phase 2 of the program are summerized below:

1. ### Plant audits and development of a comprehensive performance database.

Developing a comprehensive tool for baseline-tracking of the performance, location, and service levels of *all* 18,000 WPPs in the system is a high priority. SWNWS had designed a plant audit methodology for this purpose that also includes a survey of selected users and non-users in each community, and has assisted in the contracting of a qualified local firm for carrying out the necessary field work. On the back end, we have developed a framework and set of dashboards for capturing, updating, and analyzing the audit and survey data. Thus far, plant audits and surveys have been completed for approximately 4,000 of the communities (temporarily on hold due to the SARS-CoV-2 coronavirus pandemic).

2. ### Training and comprehensive capability building.

Capability building has been another high priority for the Government of Karnataka, and SWNWS has designed a world-class training program for plant operators, O&M contractors, and RDWS&SD field engineers. The program covers all aspects of plant operation, maintenance, and water quality management, with more than 450 trainees having completed the multi-day training program thus far (see Exhibit 4). The program uses digital presentation materials, interactive training apps, field exercises, and testing, and has been well received. Due to the success of the program, we now have a request for training another 15,000 operators across the system (temporarily on hold due to the SARS-CoV-2 coronavirus pandemic).

3. ### Audit of water quality testing labs.

The performance of state testing laboratories is a critical part of monitoring the performance of WPPs and ensuring that the drinking water dispensed meets acceptable quality standards. SWNWS is developing terms of reference for the audit of 79 state labs, developing qualification criteria for selection of audit agencies, and managing the overall audit process on behalf of the government. The purpose of the audit is to identify gaps in infrastructure, equipment, chemist capabilities and processes used at the labs, as a stepping stone for improvement of the labs across the state.

4 ### Establishment of a central call center and call registration system.

There has been no formal system for communicating, and ensuring redressal of, complaints from customers, station operators, or others within the service area. The RDWS&SD has been keen to establish a multi-modal call registration system for this purpose (web, phone, e-mail, WhatsApp, Facebook, and Twitter). SWNWS has provided technical inputs to the department related to software development and testing for the registration system, resolution tracking, reporting protocols, and an escalation matrix for unresolved issues. We've also assisted with procurement and management of call center infrastructure, service, and software providers.

5. ### Evaluation of potential alternative water purification technologies.

Currently, all WPPs are based on reverse osmosis (RO) technology, which may not be an optimum solution for all locations. There may be other technologies that better balance water-quality requirements and operating-cost efficiency, depending on source-water characteristics. SWNWS is developing a technology selection tool that applies "fitness-for-use" criteria for assessing available technologies that may be suitable at individual plant locations (see Exhibit 5).

6. ### Assessment of the RDWS&SD's information, education, and communication (IEC) program.

The government is investing significant resources in information, education, and communication (IEC) activities related to safe drinking water and sanitation, for the benefit of its citizens. SWNWS is assessing the cost and impact of these activities over the past three years, so that steps can be taken to improve the effectiveness of the IEC program. We are also developing terms of reference for the selection of a qualified entity to carry out field work for the IEC evaluation process going forward.

EXHIBIT 4: Operator Training in Karnataka's Ballari District

EXHIBIT 5:
The Technology Assessment and Selection Tool

EXPECTED PROGRAM RESULTS AND IMPACT

Although most of the work streams with the Government of Karnataka are still in early stages, we are determining how to best track program results and impact over time. The three main "success measures" we intend to track and report on are:

- Increase in the number of stations operating (compared to the initial baseline), and the overall system reliability of operation and service.
- Improvement of the performance of stations, including operating costs, maintenance activities, service levels, and financial results.
- Customer benefits related to increased access to safe drinking water, additional communities reliably served (compared to the initial baseline), and overall customer communication and complaint management.

Specific methodologies for monitoring and evaluating progress against each of these success measures are currently under development.

SAFE WATER NETWORK'S CAPABILITY FOR ENABLING AND ASSISTING OTHERS

The goal of Safe Water Network's Technical & Advisory Services practice is to enable and assist governments, small water enterprise (SWE) operators, and others involved in the decentralized water sector, leveraging our knowledge and expertise as an implementer and operator over the past ten years. We are committed to helping our clients to: learn from our experience, insights, and best practices; build capabilities for replicating and scaling successful SWE and micro-utility approaches; and improve the performance, sustainability, and impact of decentralized safe water systems.

We assist clients in achieving their goals and objectives in multiple ways:

TRAINING AND CAPABILITY BUILDING

- Water sources and station site selection
- Contaminants and treatment technologies
- Station construction, operation, and maintenance
- Solar energy applications
- Performance diagnostic and audit tools

WATER QUALITY MANAGEMENT

- Global and national water quality standards
- Water quality measurement, testing, and reporting
- Economic trade-offs of alternative approaches
- Water storage and recontamination
- Household water uses and implications

OPERATING PERFORMANCE IMPROVEMENT AND FIELD OPTIMIZATIONS

- Remote monitoring and maintenance systems
- Water ATMs for efficient, automatic water dispensing
- Household connections and prepaid metering
- Digital/mobile payments and micro-finance
- Addressing the non-revenue water challenge

FINANCIAL SUSTAINABILITY

- Frameworks for understanding financial sustainability
- Sustainability modeling and analytics
- Field-level data gathering and integration
- Sustainability gap and subsidy requirements
- Accelerating progress toward financial sustainability

SAFE WATER NETWORK'S DISTINCTIVE EXPERIENCE

There are a number of key features that set Safe Water Network's Technical & Advisory Services practice apart from others:

- Organizational commitment to safe water quality, affordability, and social/health benefits.

- Over ten years of experience in installing, operating, and maintaining decentralized water systems in multiple geographies and typologies, providing access to more than 1.5 million users.

- A track record of field-level reliability and performance optimizations, with a focus on advancing both operational and financial sustainability, supported by rigorous analytics and reporting.

- Thought-leadership related to measuring and advancing water quality, along with experience in successfully managing different water sources and treatment technologies.

- Robust, client-ready training tools, materials, and methodologies, across all aspects of safe water operation, maintenance, optimization, sustainability, and community engagement.

- A strong reputation within the decentralized water sector, which has yielded a leadership position within the Global SWE Community of Practice, and key roles in national SWE working groups and alliances.

- The ability to leverage the knowledge and expertise of multiple partners and collaborators across the water sector, with the goal of ensuring optimal benefits and impact for our clients.

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