30 November 2023
Hotel Himalaya, Kathmandu, Nepal
Summary report

The Beacon Project’s ‘Legacy that Grows’ shared learning workshop on Water Utility Management in Nepal
The key co-creation strategy outcomes of the project are:

- water-security
- safe clean water
- sanitation with dignity
- sustainable faecal sludge management
- a legacy that grows

To build upon the ‘legacy that grows’ outcome of The Beacon Project, a half day workshop on ‘Water Utility Management in Nepal’ was organised on 30 November 2023, at Hotel Himalaya, Kathmandu, in collaboration with Ministry of Water Supply. The objective of the workshop was to disseminate best practices, learnings and knowledge about water utility management as part of the safe clean water outcome of The Beacon Project. There were 44 participants in the workshop including representatives from Ministry of Water Supply (MoWS), Department of Water Supply and Sewerage Management (DWSSM), Nepal Water Supply Corporation (NWSC), development partners and sector experts. This document provides the summary and key points presented in the workshop.
Ms. Tripti Rai, Country Director, WaterAid Nepal

WaterAid Nepal’s Country Director, Ms. Tripti Rai delivered the opening remarks, contextualising The Beacon Project and sharing the workshops objectives, which align with the ‘legacy that grows’ outcome. The aim behind this overarching outcome is to create a ripple effect, fostering a legacy that continues to evolve and expand, where learnings, progress, challenges and failures are actively shared among stakeholders, partners, and collaborators, helping to accelerate progress towards SGD 6.

The simultaneous adoption of the SDGs and Nepal’s constitutional guarantee of water and sanitation rights provided impetus for this initiative. Despite the impact of the Covid-19 pandemic, the efforts continued and in the next seven years, The Beacon Project is dedicated to maximising its efforts in Lahan Municipality, incorporating a business plan for NWSC Lahan, the Municipality’s WASH plan with a robust WASH strategy aimed at ensuring universal access. All these endeavours are rooted in a systems approach guided by human rights principles, affirming everyone’s entitlement to WASH services from both duty bearers and service providers.

Five key presentations were made during the workshop and a summary of each is provided below.
While sharing the learning of the sustainable partnership modality adopted by The Beacon Project, Er. Kabindra Pudasaini, showcased how a successful collaborative approach and co-creation strategy can ensure greater accountability and good governance. With each partner delivering on their strategic strength in the project, the project is resilient and partners are committed to their responsibilities, and it is clear that joint efforts have made a difference to the people of Lahan.

There is a project technical team, a project steering committee and a project board, each guided by an agreement of collaboration, with defined roles and responsibilities. He emphasised commitment to a long-term vision, ensuring accountability and system strengthening. There is also a collaborative funding approach from all the partners, developed as one plan and budget, laying the ground for sustained initiatives. Transparency and honesty are key to The Beacon Project’s success - sharing of ideas among partners are encouraged and embraced, propelling each other towards achieving our common goal.

He highlighted how The Beacon Project has funded four boreholes for water security and resilience in the Lahan water supply system, another four boreholes were funded by NWSC, and two new boreholes are under construction with Beacon funding currently. Three in-line chlorine dosing stations were established, water quality sampling is conducted regularly, and electromagnetic flowmeters are installed. Drone surveys for GIS mapping have helped improve water resource management, with prioritisation of monitoring and quality control systems.
Several noteworthy results from The Beacon Project were highlighted, including the fact that the percentage of Non-Revenue Water (NRW) has dropped from 45% in 2016 to 36% in 2023, with the opportunity to reach for a further 20% reduction objective by replacing defunct meters. From 2016 to 2023, the number of hours available for water delivery has increased, from five hours of uncertain supply to ten hours of reliable supply hours per day. This was made possible through collaborative working of The Beacon Project with the NWSC team. Interventions were focused on source to tap improvement measures to cope with issues that were creating problems in the NWSC supply system,

Lahan has made the switch to digital record-keeping, which has improved quality measures and allowed monitoring of Key Performance Indicators (KPIs) remotely including water supply parameters, customer satisfaction, meters, billing etc.,. This visibility of data enables decision makers to focus on specific areas for improvement. Inequality in distribution of water is slowly diminishing and quality of water from tap has improved. The NWSC Lahan system now has proper hydraulic modelling, which enables improved network performance with appropriate pressure management in the pipelines.

In addition, NWSC Lahan has initiated a systematic complaints mechanism which is digitally recorded and can be seen anywhere globally. The Beacon Project also sponsors academic research in partnership with universities in the UK and Nepal to increase understanding.

Ultimately, The Beacon Project is about the people of Lahan, and the partners are united around the common purpose of delivery of safe clean water to these consumers.
Dr. Rajit passionately outlined the comprehensive vision of the Ministry of Water Supply to enhance the operational and management efficiency of water utilities in Nepal, which requires a strategic and long-term business planning approach. Emphasising the key outputs or key performance indicators for these utilities, he underscored the importance of geographical coverage, sufficiency, quality, accessibility, and reliability. The essential processes to bolster these areas must be condensed within five pivotal components of technical operation wing, financial management, commercial operation, user satisfaction and organisational management. Further, he presented the envisioned utility career path approach for the water utilities in Nepal outlining three distinct layers of functionality, performance and efficiency based on set of KPIs. He provided a comprehensive list of examples, shedding light on potential pathways for water utilities in Nepal.
Mr. Dave Ward, Beacon Board Chairperson and Head of Treated Water Distribution, Anglian Water

Dave highlighted the key aspects of Anglian Water's operations within the UK's strongly regulated water industry. He highlighted regulatory frameworks that monitor performance across various aspects, including quality of water supply (e.g. nutrient levels and metal concentrations) and non-revenue water management.

He emphasised the importance of minimising losses in the distribution system for efficiency and sustainability. He also outlined the company's customer-centric strategy and strong, visionary leadership, considering environmental challenges and adaptable planning approaches. He reiterated the importance of considering capital assets, people and finances when developing long term business plans for adequate investments and sustainable management of assets.

He noted that the above principles are critical for The Beacon Project's success beyond 2023 - ensuring sustainability in Lahan and serving as a blueprint for the wider WASH sector. The business plan for a water supply organisation must be a long-term strategic plan, based on the needs of consumers, stakeholders and the environment, and consider long-term challenges such as the impacts of climate change and large capital investment plans. The business plan must also be affordable and sustainable to both the utilities and consumers in terms of tariff setting. It is imperative to balance the need of the community versus their expectations, and to adopt a sustainable mindset. Long-term objectives must align with challenges posed by climate change along with costs, human resources, and visionary leadership to steer the utility towards sustainable outcomes.
Dr. Ishwar Prasad extended appreciation to WaterAid Nepal for organising the workshop and emphasised its importance as a forum to enable the invaluable exchange of ideas, experiences and best practices. The Beacon Project has set a unique benchmark, showcasing the power of partnership and cooperative strategies in fostering a resilient approach towards water security, safely managed drinking water and sanitation through sustainable faecal sludge management.

The project has focused on a result-oriented approach, with production now surpassing demand. He stressed that embracing innovative technologies like the electromagnetic flowmeters for water balance calculation, rigorous testing of water quality in laboratories, and checking for water leakages, along with a commitment to capacity building of staff, including training on CCTV camera surveys and water pump designs to the NWSC Branch Managers, reflects the holistic approach of The Beacon Project initiative. These learnings can be leveraged to enhance efforts to serve communities with the vital resource of clean water.
FIND OUT MORE

Visit The Beacon Project webpage washmatters.wateraid.org/the-beacon-project

Read The Beacon Project learning documents washmatters.wateraid.org/publications/beacon-project-lessons-partnership-sustainable-wash-Nepal

Read news coverage on the workshop aawaajnews.com/social-development-news/the-beacon-project-transforming-water-access-in-lahan
Appendix

Opening remarks

1. Alliance or Partnership of the Year
   WaterAid, Anglian Water Alliances, Nepal Water Supply Corporation: The Beacon Project

2. Beacon outcomes
   - Water Security: Long-term sustainable source of water for all users which enables economic development, new homes and businesses, agriculture and tourism. Improve public health and enhance the environment for future and future generations.
   - Sustainable with dignity: People in Lahan believe in the importance of hygiene and sanitation. They have safely-managed sanitation and improved hygiene practices in the home, schools and health-care facilities.
   - Sustainable local supply management: Lahan is known as having a clean environment, with local supply being safely managed and contributing to the local agricultural economy.
   - Legacy that grows: Organisations responsible for the management of water in Lahan are backed by community support and observations and can generate and raise funds as a result. Learning from this project is shared to increase capabilities across the region.

3. The Legacy That Grows
   - NSWIC Lahan Branch as a window for best practice and learning for NSWIC.
   - To drive forward NSWIC.
   - Government national policy, plan, and budget adopt the Beacon model as an example on partnership models, sector supply improvements, sustainable sanitation in federal context as ensuring rights to water and sanitisation of citizens is a concurrent role of Governments.
Presentation 1

The Beacon Project

- The Beacon Project is a long-term partnership between the UK water company Anglian Water and its Alliance (AWA), WaterAid Nepal, the Nepal Water Supply Corporation (NWSC), and the Ministry of Water Supply (MoWS) and Lalitpur municipality.
- The Beacon Project aims to develop and demonstrate holistic solutions that work across communities, local governments and utilities, and ultimately contributes to Nepal’s journey towards achieving the Sustainable Development Goals (SDGs).
- Timeframe: 2018 – 2024
- Partners: Ministry of Water Supply
- Lalitpur municipality
- Nepal Water Supply Corporation (NWSC)
- Anglian Water & Alliance partners
- WaterAid
- Location – Lalitpur municipality (population - 123,000)
- NWSC supplies water to 23 towns in Nepal to a total of 1.34 million customers

Roles & Responsibilities

Water Security
- Development of standard technical specification on borehole construction and management with NWSC Board approval and circulates to NWSC transfers for implementation
- Constructed 87 new boreholes in Lalitpur (Four Beacon funded, Two NWSC funded and Two Joint contributors) with hydrogeological supervision support
- Reinforced 8 boreholes, 6 succeeded and 2 boreholes decommissioned
- BSH planning to drill 2 additional new bores by 2020, using the new specification

Safe Clean Water
- Water quality and treatment
  - Installed 3 inline chlorine-dosing stations in Lalitpur
  - Water quality sampling now carried out by an NWSC chemist and for detail analysis samples sent to certified Laboratory of Kathmandu
  - Electromagnetic Flowmeters installed to create Distribution Zones

Partnership modality & Governance
- Declaration of intent between MoWS, AWA, and WaterAid that forms an advisory board to work together
- Agreement (Project Execution) between NWSC, LM, and WA to guide the unique collaboration, roles, and responsibilities in this partnership through Project Steering Committee (PSC)
- Project Board to provide strategic direction for the Beacon Project and approve its Plan and budget and measure final results as agreed
- Project Steering Committee (PSC) to recommend project plans for Board’s approval with agreed milestones/milestones; coordinate with MOF for execution of Beacon Plan
- Project technical team with a combination of the expertise professionals from AW, WA to provide required support to realize O&M PLAN of Beacon Project

Learnings
- Developing project governance that established a joint long-term vision and accountabilities to deliver an effective project
- Systems Strengthening approach for sustainable WASH services
- One Plan and local/national international team
- “Quick wins” to maintain commitment and engagement by all stakeholders
- Open and transparent Beacon work culture helped maintain trust between partners “organization Collaboration”

Online Chlorine dosing unit
Presentation 2

1. Improving water utility’s performance in Lahan (NWSC Branch)

Shikhar Rajbhandari – NWSC Lahan
Andy Smith – Anglian Water
Dharma Rana Chitrakar – WaterAid Nepal
29 November 2020

Presentation Outline

1. Introduction to NWSC Lahan
2. Progress on Key outcomes – Water Security and Safe Clean Water
3. Status of Key Performance Indicators (KPIs)
4. Effort and way forwards on NRW reduction

Introduction to NWSC Lahan

NWSC Lahan – Key Figures
1. Service area – Ward 1 to 10 (of 21 wards)
2. Geospatial area coverage – 39.32 sq. km
3. Total household coverage – 4244 or 77% (55%)
4. Total Population coverage – 21,000
5. No. of boreholes = 10
6. No. of 400m units below = 2
7. No. of 500 sq. sedimentation tanks = 1
8. No. of pipeline units = 5
9. Total pipe network = 87 km
10. No. of Water Quality Lab = 1

Progress on Key outcomes – Water Security (Source – Boreholes)

Challenges
- High ingress of fine sand into boreholes
- Borehole/ geotechnical contamination
- Short service life, poor water quality, and inability to read demand
- No proper decommissioning of abandoned boreholes (Contamination pathway)

Key Improvements
- Proper sited – Two physical surveys
- New specification for borehole drilling, construction
- Support with procurement process
- Hired a hydrogeologist for supervision
- CCTV camera for borehole surveys
- Training for all branch managers
- Increase Protection along with stand by boreholes

Progress on Key outcomes – Water Quality and Treatment

Challenges
- Poor quality testing lab results
- Impair monitoring of water quality, mainly limited to water quality at source
- Obsolescent existing poorly controlled (batch drawing into sedimentation tank)

Key Improvements
- Training on Water Quality Plans
- Sampling, sites identified at major assets
- Source to treatment
- Water quality lab established in Lahan
- Water harvesting
- Water quality sampling at customer taps
- Provision for laboratory on 100 metrics
- Training on hygiene, working practices

Progress on Key outcomes – Water Quality and Treatment

Challenges
- Very limited data on working good networks
- No hydraulics modeling to guide network expansion
- High rate of leakage in the network
- Limited capacity to identify & repair leaks

Key Improvements
- Dime survey/3 detailed GIS map, Network modelling
- Division of network into DCCs and SDCs
- Blackwater/flow meters for monitoring supply and demand and KPIs
- Pressure Improvements
- Academic research on intermittent water supply
- Training & equipment for leakage detection & repair
- Networks extension to Dalit community in collaboration with Municipality
- Customer complaint/feedback mechanism

Setting Key Performance Indicators (KPIs)
17

Pressure data: TCN

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Growth in Lahan

20

DZ Original Design

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DZ Phase 1

- Create west DZ first
- Requires GI assimilation, 2in service
- Requires cross connection and 3 x valves
- Accommodates growth in Palingin
- Smaller area to resolve leakage and meter anomalies — demonstrates the value of low UFW upon revenue

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DZ Phase 2

- Create NE DZ second
- Requires method of GI control and additional small PWT
- Requires 2 x valves on brigade
- Enables improved understanding of UFW level in 3 x smaller areas

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Water Balance Calculations

Uncertainty with the calculated MRF level — between 30% and 65% depending on data used and assumptions made (see next slide — 4 versions of balance)

Issues with groups of customer meters:
- 11% of customer meters are non-selective
- 3% of customers could not be read
- 7% of customers had to make no data on current meter

4 Versions of balance are:
- 1a = Total estimated from operators and unadjusted meter readings
- 1b = Total estimated from operators and adjusted meter readings
- 2a = Total from DWF totalizer rates and unadjusted meter readings
- 2b = Total from DWF totalizer rates and adjusted meter readings

To undertake versions 1b and 2b, balance, estimated 27% of customer usage based on average consumption of 73%

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Water Balance Words 1-19

<table>
<thead>
<tr>
<th>Version</th>
<th>System Input type</th>
<th>System Input (MLO)</th>
<th>Data Source</th>
<th>Consumption (MLO)</th>
<th>MRF (input – consumption)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Borehole flowrate</td>
<td>5.29</td>
<td>Unadjusted meter readings</td>
<td>5.61</td>
<td>3.37 MLO 65%</td>
</tr>
<tr>
<td>1b</td>
<td>Borehole flowrate</td>
<td>5.29</td>
<td>Adjusted meter readings</td>
<td>5.61</td>
<td>3.37 MLO 65%</td>
</tr>
<tr>
<td>2a</td>
<td>Electric-Magnetic</td>
<td>3.82</td>
<td>Unadjusted meter readings</td>
<td>3.82</td>
<td>1.91 MLO 50%</td>
</tr>
<tr>
<td>2b</td>
<td>Electric-Magnetic</td>
<td>3.82</td>
<td>Adjusted meter readings</td>
<td>3.82</td>
<td>1.91 MLO 50%</td>
</tr>
</tbody>
</table>
**Adjusted Consumer Usage: Revenue Implications**

The meter readings investigation results in:

- 1,014 customers underpaying (27% of all customers)
- The tariff for consuming 10 m³ = 110 NPR
- The tariff for consuming 19.87 m³ = 300 NPR
- The change in revenue if charged correctly:
  \[ = 1,014 \times (300 - 110) \]
  \[ = 253,550 \text{ NPR/month (€1,550/month)} \]

This is equivalent to a 20.5% increase in revenue.

**Focus Areas - Networks**

- Developing West O2 in 2024
- Flow and Pressure data being housed on the I/O portal – more visibility of data
- Fix / replace defective customer meters
- Improving water balance with more consistent flow data (inputs and outputs)
- Determine how we can extend supply hours and integrate new sites
- Planning network growth in parallel with O2 development
- Planning network development in Wards 13, 14 and 24
- Longer term planning for network to support 5-year investment horizon

Further information on the Beacon Project can be found at https://washmatters.wateraid.org/the-beacon-project
Presentation 3

1. Business planning for Improving the Operational and management efficiency of water utility

2. 95%

3. More than 42000 schemes
   More than 20000 service providers
   Average size of big utilities approximate 3000 connections

4. Coverage
   Sufficiency
   Quality
   Accessibility
   Reliable
   Outputs

5. TECHNICAL OPERATION WING
   What kind of process support the outputs?
   ASSET MANAGEMENT
   MAINTENANCE
   MORE TIME TO REPAIR
   NON-POTABLE WATER

6. FINANCIAL MANAGEMENT
   What kind of process support the outputs?
   INVENTORY DISPOSAL
   TARIFIED COLLECTION
   OPEEING RATIO
   CONTRIBUTION TO INVESTMENT
   FINANCIAL ACCOUNTABILITY

7. COMMERCIAL OPERATION
   What kind of process support the outputs?
   NETTING RATIO
   BILLING AND COLLECTION EFFICIENCY
   CUSTOMER (LADDER)

8. ORGANIZATIONAL MANAGEMENT
   What kind of process support the outputs?
   BUSINESS PLAN
   HUMAN RESOURCE DEVELOPMENT
   GESI
   QM
   ORGANIZATIONAL MATURITY
What kind of process support the outputs?

Vicious cycle of organizational management

No Equipment is not analyzed

No proper TOR

No Capacity assessed

Substandard service as the staff are not capacitated as per their job requirements

No Human resource development programs

SWOT Analysis

Strength

Weakness

Opportunity

Threat

Example:

KPI: Non-Revenue Water

Strengths

Weaknesses

Opportunities

Threats

Activities are costed – to sustain strength/maximum opportunity/minimize weakness and threats

Make sure that every KPI related statements are backed with proof

Water Utilities CAREER PATH

Layer 1: Strategy Layer
- Vision
- Mission
- Strategic initiatives

Layer 2: Performance Layer
- Focused results
- Lean Six Sigma
- Process improvement

Layer 3: Efficiency Layer
- Process efficiency
- Service Quality
- Water Quality
- Customer satisfaction
EXAMPLE (ACTIVITIES THAT MINIMIZE THE THREAT: Sub standard meter)

- Identify whether your used meters are certified or not: ISO / N5 or some others.
- From which money you are planning to identify:
  - Grant
  - Tariff?

Calibration mechanism / risk identification?

Replacement plan
- From which source you are planning to replace your saved money?
- Tariff?

OPTIMIZING THE PROCESS

MEAN TIME TO REPAIR

FROM RU QM WORK TO UQ: RUQ RENAISSANCE UNIT

DIGITALIZED JAPP BASHED

FINANCING

GRANT

LOAN

CONTRIBUTION FROM SAVINGS/COMMUNITY

SHOULD BE REFLECTED IN TARIFF

FINALLY FOLLOW THE PDCA CYCLE

SOURCE: https://iso.org/quality/resource/pdca-cycle

THANK YOU
Regulators and long-term business planning context

Dave Ward
Anglian Water, Head of Treated Water Distribution

What are we regulated on?

Performance
- Maximum concentrations of things like nutrients and metals
- Duration of outages when supply isUnavailable
- Non-revenue water, and quantified extracted from the environment

Projects & People
- Requirement for investment to achieve the levels of service
- Requirement for revenue from tariffs to sustain the agreed activity

Regulators hold Anglian Water to account but...

Visionary leadership and being a purpose led organisation with commitment to our customers and environment key.

Customer Engagement steps

1. Define
2. Identify
3. Engage
4. Communicate
5. Deliver
6. Evaluate

Our approach

We are planning to make expenditure planning more dynamic.