# A JOURNEY TOWARD SAFE DRINKING WATER FOR ALL

WATER SAFETY PLAN COUNTRY REPORT FOR SRI LANKA





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# **WSP JOURNEY IN SRI LANKA**

Sri Lanka often referred to as the "pearl of the Indian ocean" has a proud history of over 2500 years dating back to 600 B.C. Ancient water supply infrastructure marvels such as the "Giant Canal" where gentle but accurate slope makes it sometimes difficult to observe the flow of water to the naked eye and a network of large water supply/irrigation reservoirs are a testimony to engineering excellence in water resource development and management.

Modern Sri Lanka faces a multitude of challenges related to water resources management and drinking water supply. At the forefront is the need for a robust process to ensure supply of safe and clean drinking water to the island's 21 million people living in the 65,610 square kilometre area. Water Safety Plans (WSP) have been recognised as a major contributor to achieve the Sustainable Development Goals (SGGs) in Sri Lanka.

The National Water Supply and Drainage Board (NWSDB) manages 342 water supply schemes in Sri Lanka. These schemes cover approximately 40% of the total population (Figure 1). In addition, rural water supply schemes operated by local government authorities and community-based organizations provide a piped water supply to about 10% of the population. The NWSDB Master Plan aims to increase access to piped water supply up to 60% by year 2020.



### Payden, WHO Regional Office for South-East Asia, India

WHO Regional Office for South-East Asia (SEARO) has been promoting and advocating the use of water safety planning as a proactive approach of securing drinking water quality since 2006. In 2013, WHO/SEARO and the NWSDB forged a partnership to implement water safety plans. WHO has supported several national and regional WSP training activities, development of a roadmap and capacity building on WSP auditing. This has led to the formation of a National WSP Committee who provides training and oversees implementation of WSPs. WHO had developed a pool of 14 WSP Master Trainers for the region and three of them are from Sri Lanka. The three Master trainers or WSP champions have led the institutionalization of WSPs in the country by developing WSP training manuals, conducting numerous trainings, mentoring WSP implementers and supporting setting up a water safety plan auditing system which is first of its kind in the region. The credit goes to the three WSP champions.



Figure 2 – Greater Kandy Water Treatment Plant.

Recognising the contribution of safe and clean water supply for a healthy community, the NWSDB with the guidance of the Ministry of Urban Development, Water Supply and Drainage adopted the WHO recommended proactive risk management approach of WSPs in 2013. WSP Road Map was updated to establish a clear pathway for WSP implementation after a series of strategic stakeholder workshops in 2016 with WHO, World Bank, Water Supply and Sanitation Improvement Program (WASSIP) and National Universities.

The challenge of developing 342 WSPs is exacerbated by the 4500 rural and community water supply schemes managed by local authorities and small community groups. The WSP process has been gradually extended to these sectors with support from UNICEF, WHO and the World Bank. The NWSDB Strategic Plan aims to implement WSPs in all urban water supply schemes by the end of 2020.

Sri Lanka has demonstrated rapid progress in WSP implementation especially for urban water supply schemes in four years since 2016. This would not have been possible without the support from the WHO on advocacy and capacity building activities.

A commitment from the NWSDB management to establish a dedicated WSP Advisory Unit is a major milestone in the WSP journey. WSP experts in this advisory unit immensely benefited from the regional Training of Trainers (TOT) Programs offered by the WHO. These national experts have been tirelessly delivering training, internal auditing and advisory services to the 74 WSPs fully developed since 2016 (Table 1) spanning across 11 Regional Support Centres.

As a result of WSP implementation, significant water guality and process improvements have been achieved. These include infrastructure, operations and management, finance, stakeholder communication, water loss reduction, water guality surveillance and improved consumer satisfaction. Some of these achievements are documented in the paper "Measuring the Impacts of Water Safety Plans".1

The latest addition to the objectives in the WSP Roadmap is the trialling of an external audit process in 14 urban WSPs to set up a sustainable independent external audit system. This innovative auditing system has the potential to be extended to other countries in the region.

Key learnings of the WSP journey and achievements presented in this report encourage the wider WSP community to set audacious goals in their respective national settings for successful and practical WSP implementation.



### David Sutherland, WHO, Thailand

I first came into contact with the NWSDB in Sri Lanka in 2015, in my capacity as Regional Coordinator for the Drinking Water Quality Partnership between WHO and the Australian Department of Foreign Affairs and Trade. They had already prepared their roadmap for implementing WSPs and had started on implementation. The thing that has been so impressive is that Sri Lanka has followed the roadmap so closely.

The road map shared a vision and showed how it was going to achieve that vision. Sri Lanka has followed the road map almost to the letter, from early advocacy, to establishment of Steering Committees and learning through piloting, assessment and sharing on demonstration projects to longer term strategy development, policy and regulatory strengthening to large scale implementation and monitoring of WSPs. However, despite following the general WHO roadmap recommendations, they ensured that all activities, tools and strategies were appropriate to their national context.

This demonstrated that they had really thought about what WSPs could give to Sri Lanka and how best to implement and monitor them. They started slightly later than other countries in the region but guickly got into the fast lane and overtook other countries in the region and are closer to achieving a sustainable model for water safety planning than anywhere else.

The existence of a national organization responsible for the majority of drinking-water supply presents operational advantages and is almost unique in the region but nevertheless they have used this advantage to the maximum and have much to share with the rest of the region and beyond. WHO has enjoyed working with Sri Lanka on WSPs and is proud of what has been achieved and is confident that this will be sustained into the future. It shows the advantage of strategic (but realistic) thinking and planning and, most importantly implementing those plans. Every step of the original roadmap has been successfully climbed in the order anticipated and this gives clarity to NWSDB's work program, making it easier to explain to politicians, bureaucrats and donors alike.

1. https://www.aquaya.org/wp-content/uploads/2018\_Kumpel\_Measuring-the-Impacts-of-Water-Safety-Plans.pdf

# WSP JOURNEY BEGINS

## INDIAN OCEAN TSUNAMI

In 25 December 2004, Sri Lanka was hit by the devastating Indian Ocean tsunami affecting 75% of its coastal areas. The aftermath of this tragic event highlighted the critical need for total water quality management in Sri Lanka. Sanitation guidelines for cleaning and disinfection of ground water wells were developed to address immediate needs followed by the establishment of a country wide Water Quality Surveillance Program by the NWSDB in collaboration with the Ministry of Health. This initiative subsequently contributed to the verification of effectiveness of WSP.

## **HEPATITIS A OUTBREAK**

The township of Gampola (*Figure 3*) located in the central hills has a population of 24,730 ln May 2007. It is believed the water supply to the town was contaminated due to untreated sewage from human settlements in the catchment during a heavy rain event. The water treatment was ineffective due to high pathogen load. A Hepatitis A outbreak in the township was attributed to the contaminated water supply, which was widely reported in the media. Learnings from this incident highlighted the importance of catchment management and the need for water supply systems. The post incident debrief reiterated the role of WSP for the prevention and management of such incidents.

### RISK MANAGEMENT TOOLS INTRODUCED

WSP activity in Sri Lanka started in 2008 with an informal training session by a WSP expert from Yarra Valley Water, Melbourne, Australia on proactive risk management tools including application of Hazard Analysis and Critical Control Points (HACCP) to drinking water supply.



Figure 3 – Location of 2007 Hepatitis A outbreak.



Figure 4 – Illegal dumping yard adjacent to a water source

### **GOVERNMENT COMMITMENT** IN 2009

Significant water contamination related incidents in 2004 and 2007 led to the Sri Lankan Government stepping in to support the WSP process in June 2009 with the Cabinet approval for a joint memorandum on Water Quality Surveillance by the Ministry of Water Supply and Drainage and the Ministry of Health. This Cabinet paper paved the way for formal introduction of WSPs in 2010.

### **NWSDB STAFF AWARENESS** CAMPAIGN

In order to embed the implementation of WSPs, awareness and buy-in from the NWSDB staff was essential. To address this need, the NWSDB conducted a WSP awareness workshop for its key staff in 2010.



### Asoka Jayaratne, Yarra Valley Water, Australia

The level of WSP scaling-up achieved in Sri Lanka over a short period of four years would not have been possible without the commitment from the senior management of the NWSDB and the dedication and tireless efforts from the members of the Water Safety Plan Advisory Unit. I have been fortunate to contribute to the WSP journey from the very beginning. I am proud of the achievements and rapid WSP progress, especially as a Sri Lankan living overseas.

	2004	2007	2008	2009	2010
TIMELINE	INDIAN OCEAN TSUNAMI	HEPATITIS A OUTBREAK	INTORDUCTION OF WSP TOOLS	GOVERNMENT COMMITTMENT	STAFF READINESS CAMPAIGN

# **ADVOCACY AND CAPACITY BUILDING** PHASE

The success of introducing WSP for the first-time hinges heavily on advocacy and capacity building programs.

Sri Lanka has been fortunate to be a recipient of sustained and targeted WHO advocacy and support for WSP implementation since 2013. Intensive scale-up of WSP in the country began in 2016.

### **ADVOCACY SECURES** STAKEHOLDER BUY-IN

The initial advocacy meeting in February 2014 between the WHO Regional Director of the South Asian Regional Office (SEARO) and the Secretary to the Ministry of City Planning and Water Supply encouraged the Sri Lankan Government to commit to WSP implementation. A NWSDB-WSP Committee comprising of the Additional General Manager South & East, Assistant General Manager Laboratory, Engineers and Chemists was established in 2017 to oversee WSP implementation.

#### WATER SAFETY PLAN COUNTRY REPORT FOR SRI LANKA



Darryl Jackson, WASH Consultant, Australia

The three master trainers each brought to the Training of Trainer program different perspectives such as water treatment expertise, social issues, overall management and operations. Different training styles of each trainer ensured a "complete package" of WSPs was presented in subsequent in-country training and helped to build a broad-based support within NWSDB. There was absolute commitment and dedication both by the individuals and NWSDB. Finally, creativity was applied to the original training as they tailored it to local circumstances.

# Advocacy for WSP implementation continued with a series of international missions and national initiatives in the subsequent years:

- WSP National Consultation Workshop coordinated by the WHO In June 2014;
- WSP assessment and a rural WSP workshop chaired by a Technical Officer from SEARO in April 2015
- Chairman of the WSP committee; attended a WSP Biregional meeting in Bangkok, Thailand in October 2015;
- In December 2015, a special session on WSP was held at the 6th International conference on Structural Engineering and Construction Management (ICSECM) to communicate the success of WSP process in Sri Lanka to the engineering professionals in the Asia-Pacific region;
- In January 2016, a Consultant and a Technical Officer from the WHO, Geneva attended a number of advocacy meetings and workshops to promote WSP application in rural water supply systems. A basic household data collection survey template to gather information from the catchment to the end user was introduced to assist the WSP teams to systematically identify potential hazards. A pilot approach for Rural WSP was developed for the Liyanoya Development Foundation Community Based water supply in Kithulgala in the Kegalle District.

- A successful outcome of the pilot study was the establishment of a uniform implementation mechanism for Rural WSPs; and
- The WSP Road Map was updated after a series of workshops in 2016 with WHO, World Bank, WASSIP and National Universities to revisit strategic priorities including:
- a. continuous advocacy at Ministerial, District and Community levels;
- b. enhanced training and advocacy programs;
- c. finalised WSP materials for urban and rural WSPs including standard operating procedures, Emergency Response Plans, fact sheets and training materials;
- d. continued implementation of new WSPs at a rapid rate of 55 per annum;
- e. improvement of existing WSP audit performance to "good" to "very good";
- f. enhanced internal auditing process and develop an external auditing mechanism; and
- g. Inclusion of adaptation for extreme weather events.



Figure 6 – WSP progess meeting.



Figure 5 – Training by international WSP expert Consultant.



### Kamal Wickramasinghe, NWSDB

Grass-root level engagement initiated by NWSDB Training Team was a key contributor to WSP success. WSP trainers have perfectly implemented the project work assigned to them and coordinated with relevant team leaders to expand their capabilities and knowledge to overcome the barriers to improving the water quality.

2014	2014	2015	2016	2017
HIGH LEVEL ADVOCACY	NATIONAL CONSULTATION WORKSHOP	WSP ASSESSMENT AND A RURAL WSP WORKSHOP	WSP ADVOCACY MEETINGS AND WSP ROAD MAP	WSP COMMITTEE AND WSP ROAD MAP

### TAILORED TRAINING TO BUILD NATIONAL EXPERTISE

Training programs to enhance in-depth knowledge of WSP concepts amongst NWSDB staff and stakeholders progressed in parallel with the advocacy activities. WSP Expert from Yarra Valley Water, Australia was invited to deliver the first ever formal WSP training workshop in Sri Lanka in September 2013 inaugurated by the then Minister of Urban Development Water Supply and Drainage.

Ongoing capacity building activities based on WHO – WSP Manual 2009, for key NWSDB personnel progressed in all provinces between 2013 and 2016. This process successfully trained over 50 NWSDB staff and stakeholders including academia and officials for water related agencies such as the Department of Irrigation and Mahaweli Authority:

- In 2014, WHO supported a training program delivered by a WSP expert from Yarra Valley Water, Australia to develop six model urban WSPs;
- In May 2014, WHO supported a mission by a WHO Consultant from Australia to deliver a Training of Trainers (TOT) program to further extend the WSP expertise within the NWSDB and stakeholders;

- In 2014, NWSDB management committed four dedicated resources for a minimum six-year period to be available as national Master Trainers. Nominated Master Trainers successfully completed an intensive training program (*Tier 1*) in September 2014 in Bangkok, Thailand. This was followed by the Tier 2 training workshop in October 2014, in Nagpur, India. The Master Training program contributed immensely to the success of development of 74 WSPs in Sri Lanka in a very short time span. These dedicated master trainers conducted a series of WSP training programs in 2016 coordinated by the NWSDB Training Centre across 10 Regional Support Centres in preparation for rapid expansion of WSP development in the regional centres; and
- > Through the concentrated effort in WSP training, NWSDB successfully identified the next level of WSP experts as Regional Champions to further institutionalise WSP expansion to 342 urban water supply schemes. In 2016, a training program for regional champions strengthened their capacity to implement regional WSPs.

"WSP Expert from Yarra Valley Water, Australia was invited to deliver the first ever formal WSP training workshop in Sri Lanka..."



### Sumitha Sumanaweera, Independent Consultant/ External Auditor

I participated in this WSP master trainer program as a member of a team of three from Sri Lanka. The program was based on adult learning and training methodologies on in depth understanding of urban WSP principles. This was an advanced training program delivered by a team of WHO experts . The contents of the program were well designed and documented in TOT style. Based on this training we could return and contribute to development of WSP culture in Sri Lanka very effectively using the guides and tools provided.



### Nihal Rathnayake, NWSDB

Air, water and food are the most essential elements for a healthy nation with longer life. By year 2010 treated water turbidity indicated poor removal of emerging contaminants and high probability of disinfection by products with a probable risk of chronic diseases. Implementation of WSP concept would assure not only the safety of water but also the security of non-toxic food and high purity air to the nation to achieve the highest life expectancy in the world. This compelled me to conduct the WSP awareness program for NWSDB staff.



Figure 7 – Training workshop with National University, Singapore in 2012.

### IMPACT ASSESSMENT AND AUDITING TRAINING

Auditing the WSPs to verify the effectiveness is essential to maintain the WSP and focus on continuous improvement. Training for a selected group of WSP experts identified via the TOT and regional champions programs commenced in 2014 to ensure internal audits can be performed in a timely manner to evaluate the effectiveness of WSP. The NWSDB now has an ongoing and effective WSP auditing program, a successful outcome of targeted auditor training programs:

- > In December 2014, a WSP Expert from Yarra Valley Water, Australia conducted WSP assessments in Eheliyagoda in the Sabaragamuwa Province and Kandy in the Central Province to evaluate the status of implementation and to demonstrate basic WSP auditing concepts to NWSDB master trainers and regional champions;
- > In November 2015, WHO engaged a Consultant from the University of Massachusetts to introduce the Impact Assessment Tool to assess social and economic impacts of WSP implementation. NWSDB has since



2. www.mdpi.com/journal/ijerph

adopted the tool and completed impact assessments for a further 10 water supply schemes. Outcomes of these assessments were published in the paper "Measuring the Impacts of Water Safety Plans in the Asia-Pacific Region " in the International Journal of Environmental Research and Public Health<sup>2</sup> in 2018:

- Capacity building in WSP Auditing continued with further auditor training in December 2015, by a WSP Expert from Yarra Valley Water, Australia and the Technical Officer from SEARO. Training focussed on a demonstration audit of the Thuruwila Water Supply System in the North Central Province highlighting application of WSP auditing concepts; and
- > The Rural WSP Auditing Tool was introduced by the Technical Officer from SEARO at a training workshop in October 2015. This training tool has since been applied to over 100 rural systems.

2015

DEMONSTRATION

2015

RURAL WSP AUDITING TOOL

# 2018

WSP IMPACT ASSESSMENT REPORT

WSP ACCELERATION - ESTABLISHMENT OF THE WATER SAFETY **PLAN ADVISORY UNIT** (WSPAU)

WHO, IWA and other global organisations have been supporting WSP implementation for urban/ rural water supply schemes in several capacity building activities since 2006. At least 93 countries have globally implemented urban and/or rural WSPs (WHO WASH Staff Reflection Series Water Safety Planning, 2019). However, the success of implementation rests with the water suppliers and other stakeholders in each country.

In the absence of drinking water regulations in Sri Lanka, it has been a challenge to convince related jurisdictions to support voluntary WSP implementation. The NWSDB has been able to overcome this hurdle by committing resources to successfully develop 264 WSPs (fully or partially) to date within four years (*Table 1*). The secret for this success and rapid progress in implementation is primarily due to the commitment from the NWSDB to establish a dedicated Water Safety Plan Advisory Unit (WSPAU) in March 2016 in the Kandy Regional Office. Intensive scale-up of WSP implementation commenced with the establishment of this unit in 2016.

Based on the success of the WSPAU, a second Water Safety Plan Unit was formed in 2017 under the Deputy General Manager Development at the NWSDB Head Office.





Figure 8 – WSP training session.





Figure 9 WSP internal audit – process improvements -online monitoring.

Figure 10 – Structure of Water Safety Plan Advisory Unit.

### Since 2016, milestones achieved by the WSPAU demonstrates the success of WSP progress in Sri Lanka:

- > The NWSDB Strategic Plan which commits to implement WSPs in all urban water supply schemes by 2020;
- > Introduction of WSPs at early stages of new water supply schemes in collaboration with the World Bank Assisted Project (WASSIP);
- > Auditor training programs/workshops to increase confidence in internal auditing;
- > Establishment of a dedicated water testing laboratory for WSP activities;
- > Stakeholder awareness program in Universities to encourage academia to introduce WSP concepts in to curriculums; and
- > Introduction of WSP modules in Bachelor of Science (BSc) and Master of Science (MSc) curriculum by several Universities.



### J Vijayabalan, NWSDB

The first WSP in Sri Lanka, exclusively sourced from groundwater has been implemented in the Mannar District serving almost 35% of the population in the District.

Control measures identified and implemented in the WSP process have considerably reduced the ground water contamination & extraction risks. WSP implementation has also contributed to consumer, stakeholders and institutional alignment to improve water quality.





### PAJUNPPerera, NWSDB

A key benefit of WSP implementation in the Raddolugma water supply scheme in the Gampaha District has been the improvement to raw water quality due to concerted catchment protection measures implemented since 2018. WSP team established a vibrant stakeholder sub-team to drive a range of catchment protection measures. The team monitored the effectiveness via water quality testing and quarterly field surveillance visits.

A significant reduction in raw water contamination from industrial waste, discharges from animal farms, river bank erosion and pesticides has been achieved. Raw water quality now complies with the Sri Lankan Standard SLS 614. No heavy metals have since been detected in the raw water verifying the effectiveness of control measures.

The two large water treatment plants in the system now consistently achieve the filtered water turbidity of less than 0.2NTU as a result of implementation of improvements to the filtration systems and installation of a new chemical dosing system.

# SCALING UP OF WSP IMPLEMENTATION

Since the establishment of the WSPAU in 2016, WSP implementation has rapidly progressed extending to 11 Regional Support Centres. Implementation has been boosted with ongoing support from the WHO, IWA, World Banks and UNICEF. Sri Lanka has been able to achieve rapid cycling (WHO WASH Staff Reflection Series Water Safety Planning, 2019) focussing on quick wins.

The three Master trainers/WSP champions assigned to the WSPAU systematically institutionalised WSPs by developing WSP training manuals, conducting numerous training workshops, development of regional trainers and mentoring WSP implementers. The WSPAU successfully established a water safety plan internal auditing system which is considered first of its kind in the region.

Consolidation of capacity building activities by the WSPAU was central to the completion of 74 WSPs across the country over a short span of less than four years (2016 to 2019 - *Table 1*).



# **NUK Ranathunga**, Water Supply and Sanitation Improvement Project

Application of Water Safety Plan in design stage is essentially a call to actions required to ensure the sustainability of a Water Supply Scheme. Adopting such a proactive risk management approach will always keep the project goals aligned with the pillars of sustainability. I am pleased to state that we were able to make certain developments in designs to mitigate potential catchment hazards after application of WSPs in Water Supply Schemes under WASSIP.

In 2016, another milestone was achieved with the introduction of WSPs at the project planning and design stage for new water supply schemes in seven districts under the World Bank assisted Water Supply and Sanitation Improvement Project (WASSIP). The WSP initiation at design stage will become the norm for all new water supply schemes in Sri Lanka.

In 2018, training delivery process was centralised with the WSP refresher training delivered through the NWSDB Training Centre to six Regional Support Centres.



Figure 11 – WSP site visit during construction of WASSIP funded Galigamuwa Water Supply Scheme.

WATER SAFETY PLAN PROGRESS AS OF DECEMBER 2019						
NWSDB Regional Support Centre	Number of	Number of WSP Modules Implemented				WSP to be
	Water Supply Schemes	Up to Module 3	Up to Module 8	Up to Module 11	Total	developed
Central	44	6	13	3	22	22
North Central	19	10	0	3	13	6
North Western	31	2	6	3	11	20
Sabaragamuwa	27	2	13	5	20	7
Western (Production)	8	6	1	0	7	1
Uva	30	13	7	7	27	3
Eastern	49	4	9	34	47	2
Northern	24	7	2	4	13	11
Western Central	20	18	1	1	20	0
Western North	18	4	11	1	16	2
Western South	14	10	4	0	14	0
Southern	58	30	11	13	54	4
TOTAL	342	112	78	74	264	78

Table 1 - WSP Progress



### H M Abeykoon Bandara, NWSDB

Kolonnawa WSP team proactively identified the risk of contamination and flooding in the event of catastrophic failure of the Meethotamulla garbage dump. WSP team monitored the ground movements and impact on water mains in the surrounding roads over several months. Four new section valves were installed to isolate the area. During the unfortunate deadly collapse of the garbage dump on 14th April 2017, the NWSDB staff were able to immediately close valves and prevented inundation of over 70 houses saving many lives.

### EMERGENCY AND INCIDENT MANAGEMENT

Water quality emergency and incident response plans (ERP) were almost non-existent in many water supply schemes across the world prior to adopting WSPs. Even after the WSP implementation, setting up of a practical ERP can be challenging. The WSPAU took up this challenge and prepared a simple ERP for one of the small water supply schemes in the Central Province with the guidance from WSP Expert from Yarra Valley Water, Australia. This was followed by the development of several operational ERPs for over 125 water supply systems.

## **REWARD AND RECOGNITION**

In 2018, the WSPAU introduced an annual WSP Award for the three best WSPs in Sri Lanka coinciding with the World Water Day. This reward and recognition initiative encourage WSP teams to excel in implementation and recognises the commitment and dedication of operational staff involved in day to day operation of the water supply systems. The national award ceremony showcases WSP success with the participation of policy makers and senior government officials.

	2016	2016	20
TIMELINE	WSP ADVISORY UNIT	WATER SUPPLY AND SANITATION IMPROVEMENT PROJECT	EME RESF PLAN



### Jayalal Wijesinghe, NWSDB

Discharge of oil from a factory operated by a leading beverage manufacturer in August 2015 contaminated the water supply to a large area in the metropolitan Colombo. Several corrective actions to be included in the Emergency Response Plan were identified including prevention of discharge from the factories, installation of real time monitoring system at the intake structure, installation of a floating boom and consideration of additional treatment such as activated carbon along with coagulation.



Figure 12 – Intake protection – buoy installed after an incident.

# 18

ERGENCY PONSE NS

# 2018

REWARD AND RECOGNITION

# 2019

74 WSPS DEVELOPED

# **NEW ERA IN WSP AUDITING**

### INTERNAL AUDITING

Auditing is an important element in achieving the WSP Roadmap objective of surveillance and verification. The inaugural Informal external audit program was conducted by the WSP Expert from Yarra Valley Water, Australia and two Regional Auditors from Bhutan and Nepal sponsored by the WHO in 2016 in nine water supply schemes. This program not only provided valuable information on the status of WSP implementation in Sri Lanka, it also provided an opportunity for potential national auditors to learn the techniques of WSP auditing from international and regional experts. Since then the WSPAU has successfully completed 15 internal informal and formal audits of 20 water supply schemes. A template from the WHO guidance document for WSP Auditing has been adopted across all internal audits to ensure consistency.

Significant on-the-ground improvements identified during the formal and informal audits contributed to improved water quality:

- > Improved catchment management practices;
- > Improved collaboration between catchment managers;
- > Self-motivation and an enhanced knowledge of water supply system operations;
- > Emergency response preparedness;
- > Water treatment plant operational cost reduction;
- > Improved operational monitoring; and
- > Setting up of water treatment plant specific water quality targets.

## Mangala Rajapaksa, NWSDB

With the dedication of the NWSDB management and staff, Sri Lanka is on a fast track to WSP implementation in both urban and rural sectors. WSP auditing is a critical element in the successful implementation as it verifies the WSP is complete, adequate and drives continuous improvement. Internal informal and formal audits ensure the sustainable operation and maintenance of water supply systems to supply safe water to the community.

Figure 13 – internal audit site visit.





### Wasantha Gunawardhena, NWSDB

It is a privilege that the NWSDB reached a key mile stone in 2019 by completing 14 External Formal Audits for the first time in the South East Asian Region. Addressing the recommendations from these audits will ensure ongoing compliance to Sri Lankan Drinking Water Standards, WHO-WSP Guidelines and progressing towards achieving SDG 6 in 2030. WHO funding support enabled the engagement of high calibre independent auditors appointed by the IESL. Three major water treatment plants, nine water supply schemes from the catchment to the consumer and two distribution only systems were chosen for the audits covering all water supply regions. I am proud to state that plans have been made to continue External Formal Audits in selected "better performing" 12 more water supply schemes in 2020.



### Athambawa Mohamedthamby, NWSDB

The WSP implementation is undertaken by the NWSDB with financial and knowledge sharing input from WHO as external agency support. The external formal audit is an eye opening to WSP implementers on perception of external audits. The employees were motivated to adopt good practice by use of improved systematic risk assessment and management systems in Konduwatuwana water supply chains to supply safe water to consumers.

### INDEPENDENT EXTERNAL **AUDITING**

The WSPAU has been researching since 2017 to develop an external formal audit system in Sri Lanka that can be easily adopted regionally. Initial discussions were held with the Sri Lanka Standards Institute, the Institution of Engineers. Sri Lanka (IESL) and the WHO. In 2019, a successful partnership with the IESL established an external auditor selection process to conduct formal external audits. The auditor panel currently consist of a Lead Auditor who has significant auditing credentials for auditing management systems such

as ISO 9001 and a Technical Auditor with experience in the WSP processes. The new auditing process completed for the 14 WSPs in 2019 has been fully funded by the WHO Country Office.

The independent external audits issued several nonconformance and opportunities for improvements. Willingness from the WSP Teams to address the gaps identified during these audits was evident and is a positive sign of their commitment to WSP process. Key areas of improvements identified in these audits include:

- Improvements to Team meetings to focus on WSP processes;
- Incomplete hazard identification;
- > Definition of water treatment targets;
- > Linkages between risk assessment and improvement plan;
- Clear operational monitoring plans for critical risks and implementation of corrective actions; and
- Operator training.

Based on the evaluation the trial audit process and review of the results and auditor recommendations, the NWSDB intends to fine tune the process and establish an ongoing sustainable external formal audit program using 100% national expertise fulfilling another objective of the WSP Roadmap. This system has the potential to be extended to the Asia-Pacific and other regions.

"...The NWSDB intends to fine tune the process and establish an ongoing using 100% national expertise... This the Asia-Pacific and other regions."



### E A Edirisinghe, NWSDB

NWSDB Southern Region has effectively implemented 48 WSPs achieving great outcomes. During recent WSP internal audits, four water supply schemes have been awarded very high scores. More Regional Centres expect to implement water safety plans in the coming years.

The WSP program has provided a common forum for all stakeholders to work together. This enabled NWSDB to effectively operate our water supply schemes and provide sustainable water supply facilities to the nation.

	2016	2017	20
TIMELINE	WHO EXPERT EXTERNAL INFORMAL AUDIT	WSPAU INTERNAL AUDIT PROGRAM	74 W DEVI

# sustainable external formal audit program system has the potential to be extended to



### Lalith Weerasekara, NWSDB

Evaluation of WSPs in Eheliyagoda and Kandy by internationally qualified auditors has paved the way to streamline the WSP application in Sri Lanka's WSP achievements which reflect the insight and guidance given during these two WSP assessments conducted at the initial stage and considered one of the key turning points in Sri Lanka's WSP journey.

b NEW ERA IN WSP

9

**SPS** ELOPED

# 2019

**15 INTERAL** AUDITS COMPLETED

# 2019

**EXTERNAL** FORMAL AUDIT TRIAL

# RURAL AND COMMUNITY WSP PROGRESS

The Department of National Community Water Supply within the Ministry of City Planning and Water Supply was established under a Gazette notification in September 2014 to ensure safe drinking water to rural communities . Approximately, 5000 community-based organizations are currently involved in this sector. Of the 52% pipe borne water supply systems in Sri Lanka, 11% are provided by such community-based organizations.

The application of WSP to rural and community water supply systems has been strengthened by the Implementation of WSP for Rural Sector with Department of National Community Water Supply under Ministry of City Planning and Water Supply and Water Supply and Sanitation Improvement Project (WASSIP) in 2019.



### Angella Rinehold, WHO, Switzerland

Water safety planning is inherently more challenging in rural settings than in urban settings owing to a range of operational, managerial, technical, staffing and resourcing limitations that tend to characterize rural water supply systems. From the outset, the approach taken to rural WSP programme development in Sri Lanka reflected many lessons learned through trial and error globally, including simplifying the WSP approach and creating customized resources and tools to suit the local context. Critically, care was also taken to integrate the WSP approach into existing systems for efficiency and sustainability. Heeding global lessons to apply best practice from the start has helped Sri Lanka side-step common pitfalls and realize WSP benefits sooner rather than later.



Figure 14 – Rural WSP site visit for hazard identification

Water quality and living standards for rural and community water supply systems has been gradually improving with the **Implementation of simplified** Water Safety Plans.



M J Herath, Department of National Community Water Supply

Small community water suppliers may find it difficult to immediately meet community, local or national water guality targets or objectives, particularly when resources are limited. However, the development and implementation of WSPs in rural water supplies are associated with many positive impacts. Relevant to all community-managed systems, it is applicable to piped schemes, point sources such as hand pumps, protected springs or household rainwater harvesting systems and other sources. The WSP philosophy recognizes that even rural, readily achievable improvements are earned through water safety planning.



### N I Wickramasinghe, NWSDB

As a Sociologist and a WSP Master Trainer I recognised the need to pay more attention to introduce WSPs to rural water supply systems compared to urban systems. According to the country statistics, approximately 3500 rural systems, almost 10 times larger than the number of urban systems, are registered with the NWSDB and NDCWSS as community managed water supply systems. These community managed water supply systems have been plagued by the lack of basic water supply and treatment knowledge, poor water quality, limited water resources, inadequate treatment, lack of funds and lower priority at national level. Introduction of the six-module WSP enabled community managed water supply systems to gradually improve the water guality and living standards of these communities. We are systematically addressing the challenge of educating and orienting rural communities to implement WSPs. Stakeholder engagement, communication and development of targeted educational materials and tools have been essential to motivate these communities to embed a WSP working culture.



# THE JOURNEY AHEAD

Sri Lanka has made significant progress in WSP implementation, focusing firmly on achieving the goals set out in its WSP Roadmap. A new state of the art laboratory funded by the People's Republic of China is being constructed at the University of Peradeniya (Figure 15). This laboratory will significantly enhance the capabilities for the compliance and operational monitoring programs for WSPs in Sri Lanka as well as to implement WSP surveillance programs. A proposal is being prepared to establish a Regional WSP Centre for Excellence at this facility.

Like many other countries in the Asia Pacific region, catchment management has been extremely challenging for WSP implementation. NWSDB will focus on minimizing water pollution through catchment management programs.

Best practice WSP implementation in countries such as Australia, United Kingdom and the United States of America has been heavily influenced by strong drinking water regulations. In the coming years Sri Lanka will need to take up the challenge of developing a robust drinking water regulatory mechanism for the ultimate success of WSP implementation to ensure water supplied to the customers is safe and clean 100% of the time.



### S K Weragoda, NWSDB

Referring to one of Hippocrates' (a Greek physician who lived from 460 B.C. to 375 B.C. and known as the father of the modern medicine) most famous quotes, "Let food be thy medicine and medicine be thy food", all citizens of a country shall have to have equal access to safe food without keeping anyone behind. While considering "water" as a food which can cause severe disease if polluted, Sri Lanka needs to concentrate in deep to ensure a consistently safe drinking water supply to its citizens regardless where they are. Consequently, I strongly believe the WSP approach as the best management tool to be established from the ground level of the island to ensure its prosperity.

The NWSDB has been in discussions with the National Universities to introduce WSP modules to undergraduate and post graduate programs. It is expected that WSP related modules will be gradually introduced to the university curriculum in the coming years.

With the boosted WSP in-country expertise combined with the novel external auditing process, expansion of WSP beyond the water supply to the academia and the state-ofthe-art water quality testing laboratory, Sri Lanka intends to establish the Regional WSP Centre for Excellence, a one stop shop for all WSP services to the Region. Sri Lanka has demonstrated rapid progress in WSP implementation especially for urban water supply schemes in four years since 2016. This would not have been possible without the support from the WHO on advocacy and capacity building activities.



### Tharanga Udagedara, Uva-Wellassa University

The whole country is yet to receive safe drinking water, according to the National Water Supply and Drainage Board. However, the NWSDB has been able to provide tap water for a significant portion of the country together with many community-based water supply schemes. Thus, safely managing the existing water sources and supplies would be of prime importance. Recognizing this necessity, the Department of Science and Technology of Uva Wellassa University, introduced a 30-hour lecture series to its undergraduate curriculum in 2015. Several undergraduate research projects have also been conducted on WSP since 2012.



### Ananda Jayaweera, Regional Centre for Sanitation

In 2009, a joint cabinet paper was presented by the then Ministry of Water supply & Drainage and Ministry of Health to establish a water quality surveillance system in Sri Lanka. This was a great opportunity for Water and Health sectors to work in collaboration to establish a Water Quality Surveillance System in Sri Lanka.

Depletion of quality and quantity of water is a major public health risk which is aggravated by urbanization and environmental pollution. There is evidence of increasing water borne diseases in recent times and a continuous vigilance is essential in maintaining quality of drinking water supplied through water supply systems and other accessible sources of water.

Through this establishment of Water Quality Surveillance System, it expected to ensure that the drinking water supply service providers exercise continuous vigilance and proactive risk assessment to maintain water quality at all times through implementation of WSPs present contamination.

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