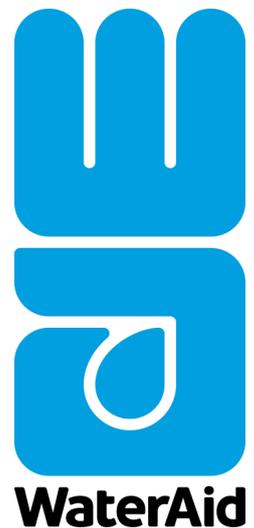




MULTI VILLAGE PIPED WATER SUPPLY SCHEME

LAKKIDIPERUR
PALAKKAD, KERALA

September 2020



LAKKIDIPERUR PALAKKAD, KERALA

In Kerala, almost 67% of the population depends on open wells, borewells, and other traditional water sources for drinking water at present. The organised water supply system under the Kerala Water Authority (KWA) and Kerala Rural Water Supply and Sanitation Agency (KRWSA/Jalanidhi) provides safe water access to the rest (33%) of the population. The new initiative by the Government of India through the Jal Jeevan Mission, launched in the year 2020, envisages filling this gap by providing household pipe water supply to all rural households by 2024 with a focus on small scale community-managed water supply schemes and an emphasis on source sustainability.

Piped water supply scheme: Location, water source and scheme details

Lakkidiperur gram panchayat (GP) in Ottapalam block panchayat, district Palakkad lies in a semi-hilly area with the Bharathapuzha river flowing to its south. The GP comprises two revenue villages Lakkidiperur-1 and Lakkidiperur-2 with 19 wards and a geographical area of 30.373 sq km. The GP has 7,482 households (HHs) with a population of 32,858, mostly OBC, SC (13%), and General (Hindus, Muslims and Christians) with a sex ratio of 919.

The major water source for the piped water supply scheme in the GP is near the Lakkidi check dam on the perennial river Bharathapuzha. The Multi Village Piped Water Supply (MVPWS) scheme at

Lakkidiperur GP was implemented under the complete supervision of the Government of Kerala as per the objectives of the World Bank which funded the Jalanidhi project. At this point, the MVPWS is managed by the Scheme Level Committee (SLC), the apex institution. The 39 Beneficiary Groups (BGs) under the scheme have a common system with a water source, pumping system, pumping main, piped water supply and purification plant, water storage tank, and water pumping distribution network. There are no stand posts in the area under the scheme. The alternative sources to fetch water during disruptions are individual dug wells.

Profile of beneficiary households

There are 39 registered BGs as legal entities in the MVPWS scheme covering 13 of the total 19 wards of Lakkidiperur GP. Of the total 5000 households in the 13 wards, a total of 3,763 have been connected with individual piped water supply connections as a part of this scheme while over 2400 households are left from the remaining 6 wards. Four wards, out of the 13 wards of the GP covered under the scheme, were selected for a study.

Table 1: Details of the wards taken up in the study

Ward No.	17	4	3	15
Ward Name	Lakkidi North	Thekkumchira Road	Mulanjur-East	Killikurissimangalam
BG Name	Gangothri	Uravu	Bhagavathi	Mitranadapuram
Population of the study wards	1852	1880	1464	2080
Total HHs in the study wards	458	470	366	520
Total HH level piped water supply connection in the study wards	345	289	186	462
Total stand posts in the study wards	Nil	Nil	Nil	Nil
Total water delivery points provided to HHs (toilet, bathroom, kitchen)	One	One	One	One

Two types of households chose to be excluded from the scheme: (a) Few rich households having their own water sources like open wells and borewells, and (b) Households with extreme political differences between ruling and opposition parties in the state. Therefore, at the start of the scheme in 2018, approximately 1465 households chose to be excluded from the scheme.

Reason for setting up of PWS

Need assessment

There was an acute shortage of drinking water throughout the GP after the 40-year-old KWA water supply scheme became obsolete in 2001. To solve the longstanding problems at two levels, a community-managed cum people's participatory scheme was needed to cover all the needy households and to rehabilitate the existing 1,100 households under the obsolete scheme.

Demand-driven

This multi ward water supply scheme is demand-driven, as per the objectives of

the Jananidhi project. Households with a lack of access to PWS came forward to participate in the scheme. The project concept was marketed and introduced by the empanelled Supporting Organisation (SO) i.e. People's Service Society Palakkad (PSSP), through specially convened Jal Gram Sabha meetings in all the wards of the GP.

Scheme cost, capital cost and contribution from different actors

The total capital cost of the multi ward water supply scheme was Rs. 11.6 crore. The main stakeholders of the project are KRWSA/ Jananidhi, GP, BG/SLC, and SO. Sharing towards the total capital cost was in the ratio 75%, 15% and 10% by KRWSA, GP and BG/SLC respectively. All SC households contributed only 5% of the capital cost as mandated by the Government of Kerala. Households having a connection under the old KWA scheme had the choice to participate in the scheme without any beneficiary contribution to the capital cost, as per the direction of Govt. of Kerala, as they had contributed towards the capital cost of the last scheme as well.



Stakeholders and their roles

Stakeholders have clear-cut roles and responsibilities at different levels of pre-planning, planning, implementation and post-implementation phases as stipulated in the Jalanidhi project. The scheme cycles are well defined in consonance with their respective roles.

- As the main stakeholder Govt. of Kerala through its implementing wing namely KRWSA/Jalanidhi, under the Ministry of Water Resources, undertook the responsibility for the overall execution of the project with the support of other concerned stakeholders.
- The Lakkidiperur GP as the facilitator of the scheme created a favourable environment for the implementation of the scheme and issued the administrative sanction.
- BGs and beneficiary HH, as active participants of the demand-driven project, were involved in its planning, implementation, and the post-implementation phases. There are 39 registered BGs, representing 13 wards, which serve as legal entities with a total membership of 3,700 HHs with around 20,000 population. Together, the 39 BGs have been federated into apex body (SLC) for administrative convenience, and efficient O&M and management of the project during its post-implementation phase.
- The selected/empanelled SOs guided the project and was the overall partner at different levels of pre-planning, preparatory stages, planning of hardware and software activities with detailed project report (DPR) preparation, implementation support, and capacity building of the BGs for its post-implementation period O&M.

Table 2: Year and duration of various phases of the project

Pre-planning	2013 (3 months)
Planning	2014-2015 (11 months)
Implementation	2015-2018 (3 years)
Post-implementation	2018 onwards

The four stakeholders actively participated and took care of their roles and responsibilities based on the following three agreements at different levels of implementation – (a) **A-1 Agreement** between GP and KRWSA (b) **A-2 Agreement** between GP and empanelled SO-PSSP, and (c) **A-3 Agreement** between GP and SLC.

Handing over of assets to the community

The multi ward water supply scheme was completed by the end of 2018 and handed over to the SLC at the beginning of 2019. The planning and implementation periods were delayed due to:

- Political differences during the planning period that led a few households to stay away from the project. By the end of the planning period, the opposition came to power and the problem got resolved when most of these excluded households took the membership of the project.
- The 40-year-old KWA scheme was in an obsolete condition. As per Jalanidhi’s norms, the 1100 households under the old scheme needed to sign the scheme transfer memorandum for its rehabilitation

and its incorporation into the Jalanidhi project. The existing consumers were reluctant to participate in the new project as they had already contributed to the capital cost of the old scheme years back. The SO took up the issue with the Govt. of Kerala and resolved it by exempting the existing KWA consumers from paying BG contribution towards the new scheme by KRWSA.

- The huge electricity bill arrear amounting to Rs. 2 crores paid by the households to KWA and by KSA to the Kerala State Electricity Board (KSEB) enabled the 1100 consumers associated with KWA's defunct scheme to clear their dues and become a part of the new PWS scheme.



Tail-end household piped water connection, Lakkidiperur.

Impact of the piped water supply scheme on women

In 2013, the GP had a few piped water supply (PWS) schemes operated by the KWA or GP and the overall coverage of PWS was only around 20% of the total households. The existing schemes were very old and inefficient. They lacked a proper O&M system. The remaining 80% of the households depended on various sources like open dug wells, streams, ponds, borewells, public stand posts, temporary pits dug at the banks of the streams etc., to meet their drinking and domestic water needs.

Fetching drinking water from distant sources and doing household-level work like washing clothes used up a major part of the day of women, precluding them from engaging in livelihood activities. The

establishment of the new scheme in 13 wards, covering more than 90% of the households allowed them more time to pursue income generation activities. Access to safely managed drinking water services was an essential step towards improving the living standards of the households.



Actual involvement of the stakeholders in various phases

The assigned roles and responsibilities as per Jalanidhi guidelines and the A1, A2, and A3 agreements between the stakeholders are as follows:

Table 3: Role of the stakeholders in various phases of the scheme

PRE-PLANNING PHASE	
KRWSA	<ul style="list-style-type: none"> Select GP, empanel NGOs as SO, hand over list of empanelled NGOs to GP; make PAD/Jalanidhi guidelines available; sign A1 agreement between KRWSA and GP.
GP	<ul style="list-style-type: none"> Submit application for Jalanidhi project with primary/ secondary data to KRWSA; participate in the orientation on Jalanidhi organised by KRWSA; sign A1 agreement between KRWSA and GP; selection of SO from empanelled list.
SO	<ul style="list-style-type: none"> Contact GP, get letter from the GP governing body regarding selection of SO.
PLANNING PHASE	
KRWSA	<ul style="list-style-type: none"> Orientation training to SO and monitoring the process at GP level; provide technical support in large WSS and issuing technical sanction (TS); release SO
GP	<ul style="list-style-type: none"> Sign A2 agreement between SO and GP, open project account for activities, Governing body resolution to convene special <i>Jalanidhi Gramasabhas</i>, participate with SO team.
SO	<ul style="list-style-type: none"> Sign A2 agreement between GP and SO; Select SO team, submission to GP and KRWSA, Organise special <i>Jalanidhi Grama sabha</i> meetings around community-managed WSS, Sensitise people using IEC materials/PRA tools, identify water sources and formation of clusters based on the water demand from the people ward-wise, Form BGs based on the demand of the people and geographical location; convene Agree To Participate (ATP) meeting at the BG level; registration/opening of bank account of BGs; mobilise community contribution (10% of capital cost) and deposit it in bank account, and facilitate GP level capital investment (15% of capital cost), Conduct survey at BG level for water source/pipeline network, prepare cost estimates, Convene Agree to Do (ATD) meeting at the BG level, in the case of multi village/ ward schemes formation of federated setup as SLC by representing all BGs of the area, opening joint bank account in the name of SLC, transferring BG contribution to SLC account, Prepare consolidated Detailed Scheme Report (DSR) of the multi wards scheme and ATD of the consolidated DSR, Get administrative sanction (AS) from GP for each SLC level intervention; submit the DSR with Community Action Plan (CAP) to KRWSA; Get TS from KRWSA; convene the Agree To Implement (ATI) meeting at the SLC level; Organise BG and SLC level management and accounts training.
BG/SLC	Work with SO on the above, maintain adequate documentation; open BG/SLC level

IMPLEMENTATION PHASE	
KRWSA	<ul style="list-style-type: none"> Organise training of stakeholders (GP, SLC and SO) on tender/selection of competent contractors for scheme implementation, Continue process monitoring at all levels; ensure construction quality management (CQM) with KRWSA approved consultants; sanction fund to completed works (installments of 40%, 40% and 20% respectively after quantifying the implemented work through M-Book recording, Hand over scheme to SLC; release SO payment; release exit order to SO.
GP	<ul style="list-style-type: none"> Monitor GP level project interventions and discuss progress in board meetings, Ensure GP contribution (15% of capital cost) in proportion to release of govt. share, Keep GP and KRWSA share in the project account, Release GP and KRWSA share to project account of SLC as per the M-Book valuation.
SO	<ul style="list-style-type: none"> Select Implementing Committee (IC) at SLC level for beneficiary level supervision; facilitate tender processes and implementation of project activities as per the DSR; M-Book valuation by SO level project engineers; settling the field level issues, if any, Ensure BG contribution (10% of the capital cost) in BG and SLC society account, Convince BG/SLC members to transfer BG contribution to SLC project account, Receive the KRWSA and GP share in the SLC project account, Facilitate release of cost of completed works to contractor per fund release order of KRWSA.
BG/SLC	<ul style="list-style-type: none"> Work with SO on the above, maintain adequate documentation.
POST-IMPLEMENTATION PHASE	
KRWSA	<ul style="list-style-type: none"> Organise ToT for O&M training for SO representatives
GP	<ul style="list-style-type: none"> Ratification of all decisions and steps taken by SLC as per Jalanidhi norms
SO	<ul style="list-style-type: none"> Provide O&M training to SLC based on O&M training manual, Facilitate fixation, approval, collection of monthly tariffs from all beneficiary HHs and their deposit in society account of SLC, Capacitate SLC for the day to day O&M of the MVPWS, and maintenance of the entire network including pumping, purification, storage, etc., Facilitate SLC to select, appoint and train post-implementation period project management team
BG/SLC	<ul style="list-style-type: none"> Work with SO on the above, maintain adequate documentation.



Apex institution to manage water supply: structure and responsibilities

The apex committee, covering 39 BGs, is registered as Lakkidiperur Gram Panchayat Jalanidhi Jalavitharana Scheme Level Committee or simply Scheme Level Committee (SLC). It is an independent legal entity with Reg. No PKD/CA/382/2014 dated 25 June 2014. The SLC comprises a general body and a governing body. The general body of SLC consists of 2 persons each nominated from the governing body of all 39 BGs i.e. 78 members with 21 women representatives. The nomination made to the SLC is either of the president, secretary, or treasurer of the Beneficiary Group.

The governing body, known as Scheme Level Executive Committee (SLEC) comprises 11 members with a minimum one-third women representatives. The SLEC is elected by the SLC and responsible for the day to day management of the water supply systems developed under this project. The members are well trained and empowered to manage the entire system with the technical support of 13-member staff comprising pump operators, valve operators, treatment plant supervisors, meter readers cum tariff collectors and finance and account persons. The administrative office of the SLC, constructed through Jalanidhi funds, is located adjacent to the GP office. The comprehensive water treatment plant cum storage reservoir is located 400 m away from the SLC office.

The SLC has a bank account as a society account at the Union Bank of India, Lakkidi branch. As per the bye-law and constitution of the SLC, the governing body members change once in three years. All socioeconomic groups are

represented in the general body as well as the governing body.

SLC faced a challenge in the initial planning and implementation period due to differences among various politically aligned groups. In addition to this, presently there is a continuous request from the households of the excluded 6 wards for linkages to a new piped water supply scheme being planned. However, as the new scheme, providing connection to 2000 new households from the 6 uncovered wards plans to draw water from the overhead tank of the old scheme, water supply shortages may be anticipated during the lean season.

In-village/ward level institution to manage water supply: structure and responsibilities

For effective implementation of this scheme, 39 BGs were formed in 13 wards of the GP. There are 2-4 BGs in each ward. The study covered 4 wards and one BG from each ward.

As a multi village scheme with 39 registered BGs as members, it has a centralised management system, and the functions of each BG are limited. BGs look after their own local/ward level distribution system. They conduct timely meter reading and facilitate the collection of tariffs from all households under their jurisdiction. The collected tariff is deposited in the SLC society account. All the BGs have a separate bank account on the same lines. They conduct annual general body meeting and executive committee meetings every year as per the constitution and bye-laws of their units.

Table 4: Beneficiary groups details of the four study wards

Ward Name (Ward No.) w – women	Lakkidi North (17)	Thekkumchira Road (4)	Mulanjur East (3)	Killikkurissimangal am (15)
BG name	Gangothri	Uravu	Bhagavathi	Mitranadapuram
BG members during formation	264; 132 w	124; 62 w	82; 41 w	264; 132 w
BG members at the time of the	272; 136 w	140; 70 w	78; 39 w	272; 136 w

All the 39 BGs are independent registered legal entities with their own governing body and general body. The general body of each BG is equally represented by men and women i.e., membership is extended for 1 male and 1 female from each household. The general body of BG meets once in a year while the BG governing body meets 2-3 times in a year. The governing body of each BG comprises 9-11 members who are elected for a term of three years with representation of all socio-economic groups. The governing body of these BGs looks after their own local/ward level pipe water distribution system. There are no other community-based institutions for water management, water conservation and water quality management in the study wards.

Presently, the SLC has a system in place for concurrent quality testing and water management through the centralised micro laboratory attached to the treatment plant. The lab comprises staff that is locally trained and recruited from Lakkidiperur village. Water quality is tested at the treatment plant every quarter on total 12 parameters in the physical, chemical and bacteriological categories. As of now, there is no testing at household level.

Quantity of piped water supply

The storage capacity of the tank is 6.5 lakhs litres with total 20 lakhs litres raw water pumping and purification (chlorination and filtration) per day in three shifts and residual chlorine test being conducted regularly. The intake of the PWS is an RCC well cum pump house to draw raw water directly from the impounded water in the river. The GP has provided land for the construction of a well at the riverbank. A pump house has been built above the well. The well with RCC steining, 4.5m diameter, and 10m depth has been constructed in the water spread about 6m inside the riverbank, the raw water transmission main is built with 250mm DI K9 pipes for a length of 5.5km from the intake well at Pazhaya Lakkidi to the treatment plant at Tankikunnu.

To solve the water quality issues, a modern scientific treatment plant has been constructed with water quality treatment and filtration processes through physical, biological and chemical purifications through cascade aerator, clariflocculator with tube settlers, rapid sand filter unit with sand as media and electro-chlorination.

All the connected households get a minimum of 350 litres a day and water supply is for a total of 6 hours. Normally the water supply is not disrupted and the system is managed well. If the water level



gets depleted in the pumping station, it is immediately supplemented by the state govt. authorities through the opening of the Malampuzha dam. A functional meter system has been introduced with all household connections. There are three trained women who work as full-time metre readers, and visit households for the reading each month. The payment is linked with the metre reading based on the slab system established in the project.

Monthly tariffs and operational expenditure

This scheme has fixed a monthly tariff for all the BGs with Rs. 100 as minimum and a varying tariff slab as per consumption of different households. The slab system designed for water tariff is - slab 1 charges Rs. 100 for the water consumption and up to 10,000 litres per month; slab 2, from 10,001 to 15,000 litres per month with an additional charge of Rs. 12 per kilolitre; Slab 3 ranges from 15,001 to 20,000 litres with an addition of Rs. 18 per kilolitre and; slab-4 from 20001 to 25000 litres with an addition of Rs. 22 per kilolitre. The monthly tariff is collected by the meter readers at door to door level and alternately, households are allowed to remit the water user charges directly at the SLC office. The tariff collected is kept in the SLC bank account. 10% of the households including the rich and poor are defaulters in paying the monthly tariff but whenever there is a continuous default noticed, their water supply is disconnected as per the by-laws of SLC. On clearing the arrears with the penalty, they get reconnected.

Capital maintenance expenditure

At the start of the scheme, the capital cost collected as a connection charge (Rs. 10,000 per connection) was used in the scheme implementation. When the scheme was implemented, the connection charges contributed by new households who joined in post scheme handover was used as corpus fund meant for future major repairs and maintenance. This was maintained by the apex institution in the Society's bank account. Besides connection cost, the monthly tariff collected is also deposited in the account and is used in minor repairs after meeting the day to day and monthly expenditure like electricity charges (around Rs. 2 lakhs per month), salary of the staff (around Rs. 1.5 lakhs per month), and material for water treatment at the plant. Currently, the operations and maintenance cost are being met by monthly tariff collection and the government contribution in O&M is nil.

Operation of in-village PWS

In this scheme, the valve operator manages the distribution of water supply from the overhead tank to the households. A 4-tier slab system is in place to prevent the wastage and overuse of water. Local-level BGs identify problems, address leakages, pilferages, breakages of pipelines (non-revenue water), and inform SLC for timely rectification by the technical team. This project also ensures a minimum of 350 litres of good quality treated water per day as per protocol to all households including the tail end wards. Sometimes, the households residing near the distribution tank may get a little more water on payment of extra charges.



Water reservoir 6.5mld and water treatment plant in Lakkidiperur, Kerala

Major and minor repair

BG contacts the SLC/apex institution and the technical team at the SLC level including two pump operators, three treatment plant operators cum lab workers, and one valve operator to rectify the minor repairs. The team is always ready to rectify these and it takes them between 4 to 6 hours to do so. But in case of major repairs, the SLC can hire the services of external experts by using the maintenance/corpus fund to rectify the problems within 24 hours. But fortunately, major repairs have not been reported in the MVPWS so far.

In-village back-up systems

Normally, there is no power failure in the supply plant area, which is about 5.5 km away from the pumping station. However, there is a transformer for the purpose of pumping water at the pumping station in case of a blackout. There is a separate 3-phase power connection for the treatment plant. If there is a power failure linked with these two connections, there is an expeditious repair system in place with the Kerala State Electricity Board giving priority to the drinking water connections.

In addition, there are 2 pumping motors (plus one standby) with 30 HP, used simultaneously for pumping raw water. Meanwhile in case of any PWS infrastructure breakdown, the SLC rectifies the issue with the support of the GP.

Human resources

There are 13 qualified, trained and paid staff for the water supply system. They are managed by the Scheme Level Executive Committee (SLEC) and paid an amount between Rs. 10000 to 18000 a month. The roles and responsibilities of the staff running the scheme are below:

- **Pump operator (2):** Looks after the pumping operations at the pump house located in Bharathapuzha.
- **Treatment plant operators cum lab workers (3):** Looks after the water treatment system at three levels at the treatment plant location and stores the treated water in the 6.5 lakh litre tanks.
- **Valve operator (1):** Looks after the valve operation in more than 30 points to maintain an equitable distribution through the water



40 year-old defunct KWA pump house in Lekkidiaperur, Kerala

supply network.

- **Meter readers (3):** All three meter readers (women) work full time by doing the door to door meter reading. Almost 1200 HHs are covered by each person in a month.
- **Office staff (1 accountant, 1 data entry operator, 1 cashier and 1 watchman):** Their work in the office includes data entry, cash collections and accounts keeping.

In addition to these, the SLEC members provide their voluntary service to supplement and complement the effectiveness of the entire system.

Source sustainability

Quarterly monitoring of water level is ensured without fail at the pumping station attached with the Pazhaya Lakkidi check dam by the technical team of SLC. In case of shortage at the pumping location, the irrigation department has a system to increase the flow of water to the Bharathapuzha river by opening the shutters of the Malampuzha dam. This

helps replenish the water level at the pumping station.

For digging borewells in the GP, prior permission is required which is issued only after the hydrogeological study by the Ground Water Board. In some GPs with overexploited groundwater aquifers, drilling of new borewells is prohibited. In addition to this, certain water conservation interventions like rainwater harvesting structures with dug wells, rain pits, gully plugs, check dams and pond recharging were also implemented under various schemes of the GP.

Inter-ward issues

There are no serious inter-ward disputes till date and the BG leaders with the help of SLC members are always ready to solve the issues to ensure smooth water supply to all households in the MVPWS. Well-designed and disciplined administrative setups of the apex institution/SLC, as well as BGs, helps to easily overcome the inter-ward issues if any.

Technological and other innovations

The latest technology of water treatment is introduced in the design and strategy of the operation management and implementation of the scheme. This ensures good quality water for all households linked with the scheme. To solve the water quality issues, a modern scientific treatment plant has been constructed with the following processes which ensure the physical, biological and chemical purification:

- **Aeration** to remove excess iron and volatile gases (Cascade aerator - 1 unit)
- **Clariflocculation followed by sedimentation** to remove excess turbidity (Clariflocculator with tube settlers - 1 unit)
- **Gravity rapid sand filter** units to remove turbidity and biological contamination (Rapid Sand Filter Unit with sand as media - 2 units)
- **Disinfection unit** to ensure bacteriological quality (Chlorinator - 1 unit)

A micro lab has been established along with the treatment plant for the periodical testing of the purified water from the plant. It helps to ensure the quality of drinking water at all the levels of the scheme.

Challenges faced by the scheme

A problem encountered right from the project onset was of political differences between the ruling and opposition parties of the GP. During the planning phase, the opposition parties were against the project, but the then ruling party managed to mobilise around 3700 households from 13 wards out of 19 wards of the GP. As a result, 39 BGs and its apex body (SLC) was established. Six wards remained out of the scheme in the planning phase. With new elections, the opposition party came to power and subsequently tried to extend the already successful PWS to the 6 excluded wards. Despite people's demand, the technical design capacity of the scheme came in the way as it was designed for a maximum coverage of only 4000 households, which has been achieved. This is the major challenge faced by the scheme at this juncture.

Another challenge faced by this scheme was the huge household connections rehabilitation package incorporated with this scheme by the KWA. The rehabilitation of 1100 household water connections under the 40-year-old obsolete KWA scheme was very difficult. These households were dubious and reluctant to participate in the scheme during the planning period. There were other issues such as huge electricity arrears of over Rs. 2 crores, the unwillingness of the KWA consumers to contribute 10% of capital cost as BG contribution, disputes between new and old consumers in the BGs etc., slowed down the overall implementation of the project. But all these issues were strategically resolved by the SO-PSSP through its timely interventions.



Suggestions for improvement

The apex body (SLC) has promoted, implemented and operated the MVPWS in accordance with the set objectives of the Jalanidhi project. The professional approach through the pre-planning, planning, implementation and post implementation phases has led to a technically feasible, economically viable and people-friendly water supply scheme. The institutional setup for the overall operation and management is remarkable and replicable. Though there are no major or minor issues at this juncture in the MVPWS, the following suggestions can go towards making the scheme sustainable, economically viable, technically adaptable and manageable from the institutional angle.

- **A separate and independent scheme for the six excluded wards** having 2000 households is highly recommended.
- 39 BGs as separate registered legal entities should be monitored and managed effectively with the **timely conduct of the governing body as well as the general body meeting and the renewal of registration** every year as per its constitution and by-laws.
- **Water tariff fixed by the SLC may be revised** as per a similar tariff introduced at the government level for public water supply schemes. This will generate more income to the SLC corpus fund to meet future investment needs.
- Even though no major power failure is reported till date, **two generator sets with suitable capacity are recommended, one at the pumping station and the other at the treatment plant location**, to ensure the overall efficiency of the water supply system.
- Presently, the capacity of the clear water sump attached with the treatment plant is 25,000 litres. Considering the regular and uninterrupted water supply needs of the 4,000 households as per its technical design, the **capacity of clear water sump is to be increased to 50,000 litres.**
- The infrastructure developed at the treatment plant cum water reservoir location is in good condition. There is enough room space above the treatment plant building to **establish a full-fledged water quality test lab.** Presently, this space is used only for doing periodical water quality tests of the treated water from this system. The proposed full-fledged lab can do the water quality test of the different water sources of Lakkidiperur GP and the adjacent GPs.
- The SLC office building faces the Palakkad-Pattambi state highway and is easily accessible from the road. **A water ATM can be established** in front of the SLC office by using the treated water from the scheme for the public in a pay and use system. This will help to complement the corpus fund of the

SLC. The scheme also needs to think of ways of raising corpus funds because as the scheme becomes old, the O&M costs rise.

- Efficient water budgeting/ balancing of the GP is highly recommended.** On average, this water supply scheme pumps 20 lakhs litres of raw water per day amounting to 600 lakh litres per month and 7200 lakh litres per year. There are around 4,000 open dug wells in the homesteads in this GP, the number of recharged dug wells is less than 100. The average annual rainfall of the GP is 2,100 mm. To balance the consumption of water and its recharge, roof water harvesting and recharge of a minimum of 4,000 dug wells is recommended. Each house with 1,000 sq ft roof area attached with the dug well can harvest, purify and recharge almost 2 lakh litres of water a year. Thus, through the recharging of 4,000 dug wells around 8,000 lakhs litres of rainwater can be recharged, which exceeds the total intake per year. The aquifer will be recharged and this, in turn, will reduce the consumption of piped water. Water literacy at all levels is, therefore, highly recommended.
- The average capital cost invested to 'take water' is Rs. 33,000 per household in the MVPWS. But the cost for harvesting/ purifying/ recharging one dug well is around 1/3rd of this capital investment. Therefore, it is highly recommended to incorporate rainwater harvesting/ recharging and other water conservation measures along with the implementation of the PWS schemes. It is our paramount duty to conserve water at least of an equivalent quantity of intake.

MULTI VILLAGE PIPED WATER SUPPLY:

Lakkidiperur, Palakkad, Kerala

September 2020

We acknowledge the inputs of Siju Mathew, a consultant field researcher for this study, in data collection and in preparation of the draft report. Amita Bhaduri helped us in editing and finalising the reports. The study was undertaken by the Policy Unit at WaterAid in September 2020, led by Nirma Bora and guided by VR Raman.

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