

water for people EVERYONE • FOREVER

ENSURING AVAILABILITY AND SUSTAINABILITY OF WATER SUPPLY SERVICES THROUGH FULL LIFE CYCLE INVESTMENT PLANNING

Gicumbi District, Rwanda Case Study

03.03.2020

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WATER FOR PEOPLE IN RWANDA

A BRIEF ABOUT RWANDA

SIZE 26,338 sq. km

POPULATION 11.5 million

LIFE EXPECTANCY 64.5 years

POP. GROWTH RATE (2016): 2.6%

GDP US\$826/capita

ADMINISTRATIVE DIVISIONS

4 provinces and City of Kigali 30 Districts (27 rural and 3 urban) 14,000 villages



GEOGRAPHICAL COVERAGE



- Registered in 2008
- Activities in Rulindo, Kicukiro and Gicumbi Districts targeting about 1 million people
- Two largest programs in terms of investment: Rulindo Challenge and Gicumbi WASH Programs
- Sanitation in seven districts in partnership with SNV and World Vision (USAID funded project)
- Sanitation marketing approaches in EF and non-EF districts
- Support Central Government

DISTRICT WIDE APPROACH

- The District Wide Approach (DWA) is a continuation of the Everyone Forever model at national level that seeks to provide systemic support to districts in their WASH service authority functions, while also recognizing the need for a strong supportive enabling environment at the national level.
- The DWA focuses on the district as the geographical entry point with the goal of the district having the systems, plans, finances, human resources, skills, knowledge, coordination and accountability mechanisms to achieve sustainable universal access.
- The DWA has been piloted in Rulindo, Gicumbi, Bugesera, Karongi, Ngorero, Nyamagabe, with the support of Water for People, WaterAid and WASAC.





GICUMBI DISTRICT

- The Gicumbi District is one of the 30 districts of Rwanda that assessed all required costs to ensure availability and sustainability of water supply services in the district.
- These costs include:
 - i. Capital Expenditures (CapEx)
 - ii. Capital Maintenance Expenditures (CapManEx)
 - iii. Operational Expenditures (OpEx)
 - iv. Direct Support Cost (DSCExp)
 - v. Costs required for water resources management
- Now the Gicumbi District is in the process of writing its full life cycle costing investment plan which will guide the district annual budgeting for water supply.



STEPS FOR DEVELOPING A WASH PLAN







DATA COLLECTION

- Service level assessment
 - Done through AKVO FLOW
 - Used to check the baseline
 - Not used in the costing
- Asset inventory
 - Collected using AKVO FLOW by visiting all the existing water systems, component by component
 - Used to identify investments for costing capital maintenance needs
- District capacity assessments
 - Excel-based tool, capturing required staff, time dedication and skills
 - Used as input for calculating required direct support costs
- Service provider assessment
 - Done in five districts through interviews and guiding questions to POs
 - Answers helped to get operation and maintenance cost system by system
- Water resources assessment
 - A water resources management plan developed
 - Used to plan local protection works (CapEx) and larger catchment management that can be included in broader DDS

TOOL USED

Capital Expenditure

- Through detailed engineering design
- Used freelance engineers
- Used for 1) projecting investment costs and 2) fund mobilization
- Operation and minor maintenance expenditure
 - Used AtWhatCost model based on PO data
- Capital maintenance expenditure
 - Done through Excel tool using data from WASAC asset inventory
- Direct support costs
 - Done through Excel tool to calculate difference between actual and required staffs
 - What could be the cost implication in bringing more staffs
- Water resources assessment
 - A water resources management plan developed
 - Used to plan local protection works (CapEx) and larger catchment management that can be included in broader DDS
- Consolidation of costs
 - Excel sheet that draws on results of previous tools
 - Allows spreading costs over time



WATER LEVEL OF SERVICE

Gicumbi 2016 Water Service Level



CAPITAL EXPENDITURE

Data collected

- Geographic coordinates of different existing water infrastructures and pipeline route
- Identification of water sources and estimation of their discharge using bucket and stopwatch
- Geographic coordinates of new and extensions water networks based on planned village settlement
- Shapefiles of administrative boundaries (NISR)
- Population data (district documents)
- Water Supply Standards from RBS
- Other similar studies

Design parameters

- Design period = 25 years starting in 2018
- Population growth = 3% (2019 2029), 2% (2029 2044)
- Population density = 6 people per household (HH)
- Leakage Factor = 15%
- Tap Run-Time per Day = 6 hours
- Peaking Factor (PF) = 4 (24 hours / Tap Run-Time per Day)
- Flow to Tap = [Peaking Factor] x [Average Daily Flow]
- Residual Pressure Head at Tap = 10 20 meters
- Friction coefficients:
 - \circ For PVC, n = 0.021
 - \circ For galvanized steel, n = 0.02 to 0.03
 - \circ For cast iron/ductile iron, n = 0.03 to 0.035

CAPITAL EXPENDITURE

- 92 water supply systems have been designed
- 29 systems are new water systems
- 51 are to be totally rehabilitated
- 11 are partial rehabilitations
- 17 pumping water systems
- 75 gravity systems
- One reinforcement of Gicumbi city water supply network

The total cost is 42,220,896,838 Frw equivalent to \$45 million

OPERATION AND MINOR MAINTENANCE EXPENDITURES

- Used AtWhatCost tool developed by Water For People and IRC
- Interviews with POs
- Filled out with general information about expenses, costs of investment in the system (calculated to determine the cost of minor replacement)
- Detailed calculation of all the projected costs for a certain period, differentiated between operation and maintenance, minor repairs, and major repairs/rehabilitations
- Gicumbi has two private operators: Ayateke Star Company and PAKAAM Ltd
- Both manage 21 water supply systems
- Both use the same tariffs and will get a new system to manage as soon as they are completed





OPERATION AND MINOR MAINTENANCE EXPENDITURES

Gicumbi OpEx Assessment



- Used an Asset Registry tool used to identify, catalog, and classify all water systems within a district.
- It helps to flag, prioritize, and classify different water systems within a district based on risk and need for repair.
- For prioritization, the following areas are considered:
 - Age of water system components
 - Physical state of water system components





Cost categorization

Physical State	Definition	Life cost cycle step	
Normal	The current physical state does not impact the functionality of the particular component. Minor repairs and/or more in- depth maintenance might be needed to prevent future problems, but these deficiencies that will need eventual repairs do not inhibit the functionality of a component at the time of the assessment.	OpEx	Minor Repair
Poor	The current physical state is such that the functionality of that component is impacted and inhibited. The component will need repairs or replacement to function at full capacity.	CapManEx	Major Repair
Does not function	The component is not functional whatsoever given the significance of the repairs needed and is likely impacting the overall function of the water system itself. It will need full-scale replacement or rehabilitation, or large-scale repair to function again.	CapManEx	Construction/ Replacement

Cost reference units

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	А	В	С	D	E	F	G	Н	I.	J
1	Component	Activity								
2		Minor repair (Accessories/fittings)								
3				PVC (PN 10)	PVC (PN 16)	PVC (PN 25)	G.S (PN 10)	G.S (PN 16)	G.S (PN 40)	G.S (PN 45)
4			DN	accessories/fittings	accessories/fittings	Unit length (1m)	accessories/fittings	accessories/fittings	accessories/fittings	accessories/fittings
5			40	5,600	35,000		11.000	18,000		
7			60	21 500	40,000		11,000	25,000		
8	Conduction Line		65	21,500	85,000	150.000		25,000		
9			75	53,000	110 000	175 000		35 000		
10			80	120,000	115,000	200,000		40,000	45,000	
11			90	150,000	193,000	,		55,000	,	
12			100	185,000	200,000	230,000		85,000		120,000
13			110	200,000	215,000	275,000		95,000		
14			125	210,000	250,000			130,000		
15 16 17		Material						Material		
18		Stone Masonry	Tank size (m^3)	Minor repair	Major repair	Construction/Replacement		Concrete	Tank size (m^3)	Minor repair
19			5	208,000	2,000,000	3,800,000			5	
20			10	247,000	3,000,000	5,600,000			10	
21			15	286,000	4,200,000	7,700,000			15	
22			20	300,000	4,300,000	8,300,000			20	
23	Storage tank		25	325,000	5,000,000	9,950,000			25	
24			40	330,000	5,100,000	10,500,000			40	
26			60	700,000	6,000,000	13,000,000			60	
27			80	975 000	6 500 000	15,000,000			80	
28			100	1,170,000	7,100,000	15,800,000			100	2,500,000
29			125	2,000,000	8,000,000	17,500,000			125	· · · · · · · · · · · · · · · · · · ·
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Two types of cost are provided:

• Overview of the investment needed for CapManEx based on physical state

When the physical state of a component is considered "poor" or "does not function" the tool considers the cost of major repair or construction/replacement respectively from the cost reference units. This is generally true, but there are exceptions noted in the CapManEx categories tab, such as tap stands, which are always OpEx even if the condition is poor/does not function.

• Overview of the investment needed for CapManEx based on remaining useful time

When the physical state of a component is considered "normal", the tool considers the cost of construction/replacement for that component and projects it into the corresponding year of replacement. The reference design lifetime information is obtained through a reference sheet tab

Overview of the investment needed for CapManEx



CapManEx based on age CapManEx based on physical state

DIRECT SUPPORT COST ASSESSMENT

This tool is used to evaluate if the district has the required resources (financial & human) to ensure sustainability of WASH services.

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1	Financing Forev	er - Direct Suppor	t Costs				1	1 Financing Forever - Direct Support Costs					
2		Exchange Rate	780 n	**Note - this area is OPTIONAL. If it helps to calculat eded, based on work days and needed Activities, ple calculate another way, that is fin	e the number of staff ase use. If you prefer to e.				Exchange Rate	Total number of working	the number of staff se use. If you prefer to		
3 Country	Rwanda	_	w	ork Activity (annual) (to edit for local context)	# of Days		2						
4 District	Rulindo		F	ormulation C			3 Country	Rwanda		days in the country	# of Days		
5 Water Technology in the District (gravity, handpump, electric pun	pgravity + electric pump + springs		Re	uest from the commu			4 81.11	0.11.1					
6 Actual number of systems in District	63 gravity	_	Sel	ection of commun			4 District	Rulindo	_	ronnulation of a project			
8	507 springs	-	Dis	sussion with		Incort the	5 Water Technology in the District (gravity, hand	dpump, electric pump) gravity + electric pump + s	springs	Request from the community to District	2		
9			Pri	ritize the light of		insert the	6 Actual number of systems in District	63 gravity		Selection of community	2		
10 Actual Number of Communities in District	494		Ae	eement b/ LISLOI	1		7	19 electric pump		Identification of needs	5		
11 Number of annual work days - one person	230	_	Fo	mulatio		number of	8	507 springs		Number of doug from the	list of 6		
12 Work Days to Fulfill Necessary Activities	0 00	_	Est	activities			9			number of days from the	IISCOI 7		
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15 Ideal Municipal WASH Budget (local currency) - 2016 (yellow lin 16 District Water Beard Permenent Secretary	nes to be edited for local context)	x					12 Work Days to Fulfill Necessary Activities	863.9		Establish the goals of the project	1		
10 District Water board Permanent Secretary	7.200.00	20	50	tors		each	13 Number of Staff Required	3.76		Present the project to the local authority and request the authori	ization 3		
18 Administrative Support Costs (Finance, HR, Procurement, Audit, Infras	tru 7,200,00	00	Na	SKIIIS		o cioni	14			Identification of key actor and responsibility of the project	4		
19 Transportation Costs (Fuel, Per Diem, etc)	7,500,00	<mark>)0</mark>	To	logras		octivity	14			internation of key actor and responsibility of the project			
20 Operations Costs (phone, internet, paper/printer ink, etc.)	1,500,00	00	Wa			activity	15 Ideal Municipal WASH Budget (local curr	rency) - 2016 (yellow lines to be edited for local cont	ext	Currow and planning			
21 Monitoring and Mapping Costs (enumerators, technology, etc) 23 Office Equipment (loctor and multimodia)	10,000,00	<u>0</u>	50	assess-			16 District Water Board Permanent Secretary		5,000,000	a contraction of the second	3		
23 Training Costs	500.00	percent of total	budget Su	vev of pro			17 District WASH Officer		7.200.000 ne	e tool will calculate the nun	nber of 2		
24 TOTAL	41,400,00	0.41%	Ba	icplan Ment			18 Administrative Support Costs (Finance, HR, Pro	ocurement, Audit, Infrastr	7.200.000	and the second second	1		
25			W	ter demand p			19 Transportation Costs (Eucl. Per Diem. etc)	-	7.500.000	realistic staff required	2		
26 Actual Municipal WASH Budget (local cur	rency) - 2016		Ela	boration of bas			20 Operations Costs (phone internet paper/prin	starink atc.)	1 500 000		0.5		
27 Total District WASH Budget	20,000,00	0.20%	10	lity planning			21 Manitaring and Manning Costs (enumerators	technology etc)		Coll testing and investigation	0.3		
29	20,000,00	~	En	Ironmental Impact Assessme			22 Monitoring and Mapping Costs (endinerators, 22 Office Equipment (leater and cultimedia)	recimology, etcy	1 500 000	Weterstein and investigation	0.5		
30 Actual District Number of Staff		2	Eco	nomic and financial appraisal			22 Office Equipment (laptop and multimedia)			water source survey	0.1		
31				lesian			23 Training Costs		500,000 percent of total budget	Survey of procurement condition	0		
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DIRECT SUPPORT COST ASSESSMENT



WATER RESOURCES MANAGEMENT PLAN

- Gicumbi District developed district water supply sources management plans to ensure sustainability of water supply services.
- The study showed a perceived imbalance between water demand and supply in some sectors (administrative entities).
- Water quality results showed that among the seven parameters tested, total coliforms were observed in most of the springs and lower values of pH.
- The study recommended agroforestry with progressive terraces/cutoff drains, agroforestry with cutoff drains/horizontal trenches, agroforestry with radical terraces/gully treatment, forest plantations, and natural forests as collection measures at catchment levels.
- Diversion ditches, fences, planting, eucalyptus removal, and progressive terraces were recommended at immediate sources catchment level.
- To deal with the water quality aspect, the studies recommended installation of chlorination units (as disinfection facilities) and pH regulators.

The water resources management plan implementation cost for immediate source catchment level were imbedded in the water system capital investment cost. The collective measures at catchment level were recommended to the Gicumbi District and the Ministry of Environment for consideration in their annual planning for ecosystem protection.

CONSOLIDATED COST

The tool used aggregates all costs calculated in separate tools at district level and provides an overview of all expenditure required to provide and maintain water services for the coming 10 years.

Service provider	CapEx + WRMP	CapManEx	OpEx	DSexp		
WASAC utility	Entity: WASAC Dvpt Source: Central government transfers, Local taxes and District development partners	Entity: WASAC Dvpt Source: Central government transfers, Local taxes and District development partners	Entity: WASAC utility Source: Tariff			
Private operator	Entity: WASAC Dvpt, District Source: Central government transfers, Local taxes and District development partners	Entity: WASAC Dvpt, District Source: Central government transfers, Local taxes and District development partners	Entity: PO Source: Tariff	Entity: District Source: Central government transfers, Local taxes, Royalties and District development partners		
Community/Individual	Entity: WASAC Dvpt, District Source: Central government transfers, Local taxes and District development partners	Entity: WASAC Dvpt, District Source: Central government transfers, Local taxes and District development partners	Entity: community Source: Tariff			

CONSOLIDATED COST



Findings and Recommendations

- The district has secured all the funds for all the new infrastructure, but it has a gap in 2025 due to the construction of a new treatment plant
- The tariff will fully cover OpEx and no gap was observed in the 10 years
- The district does not allocate budget for capital replacement cost and should start planning for that based on the result of the capital maintenance cost
- The district needs to increase the number of staff and budget to cover the gap identified in the Direct Support cost
- The full life cycle costing investment planning should be undertaken in all remaining districts of the country



