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Life-cycle costs approach (LCCA) for sustainable WASH service delivery: A study in rural Andhra Pradesh, India[1]

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Abstract

This paper illustrates the usefulness of the life-cycle costs approach (LCCA) framework and methodology in addressing slippage and sustainability issues in the WASH sector in the State of Andhra Pradesh (AP), India. The paper examines the actual cost of provision in 40 villages spread over two agro-climatic zones by cost components and identifies the gaps in (public) investments and how these gaps are responsible for poor, inequitable and unsustainable service delivery.

The analysis brings out clearly that government expenditure on WASH is almost exclusively capital expenditure on infrastructure while other important cost components like planning and designing, capital maintenance, source sustainability, water quality, etc., receive little or no allocation. Moreover, the actual life of infrastructure is much less than the normative life span, which is the basis for cost estimates. This results in ad hoc investments in capital maintenance expenditure and poor service levels.

The key message of the paper is that "the rural drinking water sector is underfunded and funding allocations for rural water are distorted". It is argued that budget allocations to the drinking water sector need to be revised with due allocation for other important components such as source sustainability, capital maintenance, water quality and climate change, etc. The paper argues in favour of a paradigm shift in terms of developing a comprehensive and realistic costing mechanism that addresses various aspects of drinking water like slippage, water quality, etc. LCCA is one such tool that can contribute towards achieving water security at the household level.

Keywords*: Life-cycle costs; drinking water; sustainable service; financial analysis; rural, Andhra Pradesh; India.*

[1] This paper is part of an ongoing action research project, WASHCost, supported by IRC, The Netherlands, in four countries (India, Ghana, Mozambique and Burkina Faso). For more information see www.washcost.info.

Key message: *'The rural drinking water sector is not only being underfunded but also receives distorted allocations'.*

I INTRODUCTION

In India, budgetary provision towards water and sanitation in the 11th plan period (2009-14) is about US$ 2.62 billion per annum. Annual central budgetary allocations have gone up by 67 per cent between 2002-03 and 2008-09 in absolute terms. However, in relative terms, the share allocated to the WASH sector from the national budget was more than halved during the same period (Reddy and Kumar, 2010). On a per capita basis this is modest or low at about US$ 3[2] per capita or US$ 13 per household per annum when compared to other countries with similar level of development. Despite these modest per capita allocations, coverage and access to WASH services appear to be substantial as reflected in Government publications; 94 per cent of the rural population has access to safe drinking water through 4 million hand pumps and 0.2 million piped water schemes (GoI, 2008). However, systems often provide irregular and scanty water supplies at the point of use and the incidence of slippage –loss of access to services that were previously received – is substantial at 30 per cent of communities (Reddy, et al., 2009). One of the main reasons for slippage is that the budgeted unit costs of providing water do not take account of the need for ongoing source protection or of system rehabilitation costs. In the absence of appropriate costing and recurring investments in the water and sanitation sector, slippage has become a common phenomenon.

The latest guidelines (GoI, 2010) emphasise the shift away from the conventional approach of normative service levels measured in litres per capita per day (lpcd) and a move towards water security at the household level, which includes equity aspects. The guidelines, in order to ensure water security across locations and socio-economic groups, recognise the importance of source sustainability by allocating 20 per cent of funds to that end. Substantial allocations are also made for water quality (20 per cent); operation and maintenance (10 per cent) and to mitigate the impact of natural calamities / climate change (5 per cent), alongside the allocation for access (38 per cent). The guidelines also propose the devolution of resources and responsibilities to local bodies (Gram Panchayats, the lowest level of local government in India) with the line departments playing only a facilitating role.

This paper illustrates the usefulness of life-cycle costs approach (LCCA) framework and methodology in addressing the slippage and sustainability issues in the WASH sector. In the process the paper examines the actual cost of provision across agro-climatic zones by cost components and identifies the gaps in investments and how these gaps are responsible for poor, inequitable and unsustainable service delivery. Specific objectives include:

a) Assessing the cost of rural drinking water supplies in an LCCA framework across villages in two agro-climatic zones, and
b) Estimating relative expenditure on different LCCA cost components vis-a-vis the governmental guidelines.

[2] An exchange rate of US$ 1= INR 48.40 is used throughout the paper.

The paper is organised in four sections (of which this is the first). Section two briefly discusses the methodology and the profile of the area of the study. Section three examines the total costs of provision at present and compares them with existing governmental guidelines. Section four summarises the findings and makes some policy suggestions.

II METHODOLOGY

The LCC approach analyses the aggregate costs of ensuring the delivery of adequate, equitable and sustainable WASH services to a population in a specified area. Unlike the conventional LCC assessment, the life-cycle costs approach adopted in WASHCost does not address project evaluation, but adopts a service delivery approach, i.e., it assesses the costs for providing a certain level of service in a sustainable manner. It looks at the costs that have gone into service provision rather than incorporating all the costs that are demanded in a project evaluation frame. The costs assessed in WASHCost cover the construction and maintenance of systems in the short and long term, taking into account the need for hardware and software, operation and maintenance, the cost of capital, source protection, and the need for direct and indirect support costs, including training, planning and institutional pro-poor support (Fonseca, et. al., 2010). The delivery of sustainable services also requires that financial systems are in place to ensure that infrastructure can be renewed or replaced at the end of its useful life and to extend delivery systems in response to increases in demand (Reddy, et. al., 2009).

Methods and tools

The database generated for WASHCost analysis is a combination of natural, social, economic and political aspects that influence WASH service delivery over the life stages of the schemes. This could be achieved through a combination of methods and tools for understanding the dynamics of service delivery. The paper is based on the information generated from 40 villages spread over two agro-climatic zones of AP viz., Southern Telangana zone (STZ) and Central Telangana zone (CTZ). The sample villages were selected on the basis of a stratified sampling design in each of the agro-climatic zones. A village is considered as a sampling unit for the survey. The sample villages represent the three service states of drinking water services in India: Fully Covered (FC), Partially Covered (PC) or No Safe Source (NSS).

Data is generated at two levels. Level one cost data was obtained from 40 villages – 20 in each zone. This data was generated from the official records of the Rural Water Supply and Sanitation (RWSS) department at district level. This data was triangulated or crosschecked with the help of data generated from the village panchayat (local government).Level two is detailed household data on socio-economic aspects along with information pertaining to drinking water gathered from 20 villages i.e., 10 from each zone. General household information was collected from all households in the village, while detailed information was elicited from a sample of 50 households from each village. This means that detailed household information was generated from 1,000 households, 500 households in each zone.

Both qualitative and quantitative research tools were used to elicit information at secondary as well as primary levels. Qualitative methods such as Rapid Rural Appraisal (RRA) and Qualitative Information Systems (QIS)[3], etc., were adopted in particular to elicit information from WASH service users. Quantitative information was collected from the Department, Gram Panchayat, households, communities, key informants, etc., and verified, updated and augmented as necessary.

Components of life-cycle costs

Cost components include not only the construction and operational costs but also the capital maintenance and IEC (information, education and communication) costs.

Cost components and calculations[4]

CapEx or capital expenditure has two components, namely hardware (CapExHrd) and software (CapExSft). CapExHrd is the establishment of water infrastructure, water extracting elements, purification equipment, storage reservoirs, distribution systems, etc. CapExSft includes the costs of planning and designing the water and sanitation schemes at village level. The capital costs, hardware as well as software are one-time costs. For the purpose of the present analysis we have taken only investments in infrastructure that are still functional. All the CapEx investments are cumulated over the years. All costs are converted to current values (2008-09) using the National GDP inflator for the specific years and converted to US dollars using the average 2008-09 exchange rate (US$ 1=INR 48.40).Households also themselves invest in CapEx in the form of overhead or underground storage tanks, pumps, etc. The present value of these investments was elicited from the sample households.

Capital maintenance expenditure (CapManEx) is another major expenditure head that is spent on renewal and rehabilitation of systems i.e., replacement of major equipment like pump sets, boreholes, plant equipment, distribution systems, etc. CapManEx is also summed over the years and converted to current values.

OpEx is the operational expenditure spent on the regular maintenance of the systems. OpEx is the responsibility of the panchayati raj (local government) institutions in AP. This information is gathered from the panchayati records. Apart from the public expenditure on operation and maintenance, households, especially those having household connections, also spend on the maintenance of their taps and storage systems. Therefore, we have made a distinction between public (OpEx) and private (HHOpEx) operational expenditure. OpEx is spent annually and hence we have taken the average of the years for which data are available after bringing them to the current value. Often OpEx is available for the current year only.

ExDS or the expenditure on direct support costs are defined as the investments or expenditure on support during post implementation of the WASH systems. These could be in the form of IEC activities, demand management initiatives. But, such investments were not found in the case of

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[3]These methods are described in WASHCost publications. In general they use focus groups and innovative methods to capture people's experiences and opinions of service levels.

[4] For details see WASHCost (India), 2010.

drinking water, especially in the sample villages. Direct, in this case, means directly to the community.

ExIDS or the expenditure on indirect support costs are the costs associated with macro planning and policy making at the national and state level. These costs are expected to be available in planning and budgetary documents. However when we checked, we found that these are available only at a very broad level under numerous different budget heads. It would be very difficult to segregate the indirect support costs for WASH sub-sectors while making assumptions without having any idea of the planning and policy making allocations at the national or state level could be unrealistic. However, a rough estimate of these costs could be attempted at a later stage in the project, when more detailed data are gathered.

The cost of capital (CoC) is the interest payments on any borrowed money. In the context of AP the borrowed money and the interest paid on it is shown in the records only in the case of peri-urban / urban locations. In the case of rural water supplies, there is no information on the money borrowed from external agencies even at the departmental level (state). Therefore, we do not include CoC in financial analysis. However, the rate of interest of 6.25 per cent, which is the actual cost[5] of capital for urban water supplies, could be used for economic analysis.

CapExHrd and the CapManEx are annualised using the normative life span and actual life of the systems. We have used the component normative life spans for hardware such as boreholes, pumps, pump houses, overhead reservoirs, handpumps, etc. The normative life span is given by the department which is nothing but the expected life of a specific component. The actual life span is the actual number of years the component lasts. Comparing these two one can assess whether the actual cost of provision is more or less than the estimated costs.

Profile of the study area

The sample villages are spread over three districts in each zone (Table 1). The average size of the sample villages is comparable across districts (about 300 households), except in Nalgonda (more than 500 households). Average normal rainfall ranges between 500 mm and 1000 mm per annum. The social composition indicates[6] that backward communities dominate in most sample villages. Average annual household expenditure ranges between US$ 800and US$ 1,300. Literacy levels in the sample villages are comparable with the state average in all but two districts, i.e., about 60 per cent.

[5] This is the actual rate charged in nominal terms by the Housing and Urban Development Corporation (HUDC).

[6] Social composition mainly consists of SC; BC and OC communities.

SC= Scheduled caste: These communities are at the lowest rung of the social ladder and have constitutional provision of reservations in educational institutions and public sector jobs.

BC= Backward castes. These communities in the middle of the social ladder have reservation in educational institutions and public sector jobs. The extent of reservation varies from state to state depending on the proportion of the community in the state population.

OC = Other Castes. These are at the highest rung of the social ladder.

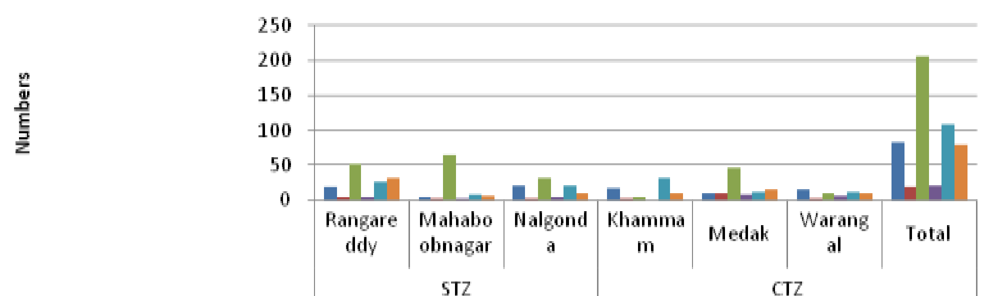
Zone	District	No. of Habitations	Avg. Normal Rainfall (mm)	Avg. Village Size (#HH)	Social Composition (SC/BC/OC)	Avg. HH Expenditure (US$/year)	Avg. % Literacy	Service level – Quantity (lpcd)
STZ	Rangareddy	5	896	324	31/53/16	961	62	62 (55)
	Mahaboobnagar	2	556	339	15/38/47	868	55	50 (44)
	Nalgonda	3	905	537	24/59/17	1171	62	64 (57)
CTZ	Khammam	4	987	373	46/37/17	1226	63	61 (54)
	Medak	3	935	329	27/53/20	1334	57	58 (49)
	Warangal	3	1017	322	19/78/3	1087	61	56 (50)

Note: Quantity figures are for non-summer months. Figures in brackets indicate quantities during summer months.

Table 1 Profile of the Sample Villages

Status of Drinking Water: service levels

Groundwater is the main source of drinking water inmost sample villages except in the three that are served by multi-village schemes, sourced from surface water. All other schemes have groundwater as source and source sustainability is a major issue. All the villages depend on multiple sources like open wells, handpumps, bore wells, public stand posts (PSPs), private taps, etc. (Figure1). Service levels recorded in WASHCost include water from all different sources including buying water, not only water drawn from public sources. The quantity received at the aggregate level is relatively high in the sample villages (well above the norm of 40 lpcd in most villages), which could be due to their location, in fringe areas around urban centres. However, within the villages more than 30 per cent of households in each zone receive less than 40 lpcd. The general coverage or access to public water distribution infrastructure is fairly good though the quality of infrastructure is poor. About 51 per cent of the households have household connections in Southern Telangana as against 61 per cent in the Central Telangana Zone.



	Rangareddy (STZ)	Mahaboobnagar (STZ)	Nalgonda (STZ)	Khammam (CTZ)	Medak (CTZ)	Warangal (CTZ)	Total
Wells/bore wells Working	18	4	20	17	10	14	83
Wells/bore wells Not working	3	2	1	1	9	2	18
PSPs Working	51	64	32	4	46	9	206
PSPs Not working	3	2	3	0	8	5	21
Hand Pumps Working	25	8	21	31	12	12	109
Hand Pumps Not working	31	5	10	9	14	10	79

Note: PSP= Public Stand Post

Figure 1 Water Infrastructure in the Sample Villages

Qualitative perceptions of the people on different indicators of service levels indicate that only between a quarter and a half of respondents (27%-48%) gave more than a 50 per cent rating score to adequacy (of the quantity)of water and only a quarter to a third (23%-34%) did so in terms of quality (Tables 2 and 3). The situation in non-summer is generally better than the situation in summer for adequacy and for predictability, but in both zones quality received poorer scores in the non-summer period. The scores in CTZ are generally better when compared to STZ, except in the case of summer adequacy, which could indicate why there is a high dependence on informal sources in CTZ. Water quality is a major concern in majority of the sample villages in STZ and in most cases water quality tests proved that people's perceptions are right.

(% of respondents scoring water services out of 100 for adequacy, predictability and quality)

	Percentage of respondents scoring water service in each band					
Scores in bands from 0 to 100	Adequacy		Predictability		Quality	
	Summer	Non Summer	Summer	Non Summer	Summer	Non Summer
0– worst	2%	5%	3%	6%	3%	6%
1 TO 25	20%	13%	20%	14%	50%	48%
26 TO 50	44%	45%	32%	32%	19%	24%
51 TO 75	19%	24%	31%	34%	24%	18%
76 TO 100 - best	15%	14%	14%	15%	4%	5%

Table 2 Peoples' Perceptions of Service Levels in STZ

(% of respondents scoring water services out of 100 for adequacy, predictability and quality)

	Percentage of respondents scoring water service in each band					
Scores in bands from 0 to 100	Adequacy		Predictability		Quality	
	Summer	Non Summer	Summer	Non Summer	Summer	Non Summer
0 - worst	2%	1%	2%	1%	3%	3%
1 TO 25	39%	19%	27%	8%	45%	44%
26 TO 50	32%	32%	17%	30%	18%	23%
51 TO 75	10%	19%	34%	39%	30%	26%
76 TO 100 - best	17%	29%	20%	22%	4%	4%

Table 3 People's Perceptions of Service Levels in CTZ

Despite continuous capital expenditure on water supply infrastructure, water services are not reliable especially in summer in some sample villages. People perceive that adequacy levels are better during non-summer periods, especially in Central Telangana. This could be because water demand or use levels are higher during summer due to high temperatures, and because livestock are watered at the house during the summer months. Despite the low availability of water from the public systems during summer, households tend to manage increased water demand through using multiple sources. Sometimes the villagers go even to agricultural wells for fetching water. This is reflected in the time spent on fetching water.

Overall, and taking into account the service level ladder developed by WASHCost[7], these two zones would fall in the 'basic' service category at the aggregate level. Although there are inter- and intra- village variations in service levels, when all aspects of the service ladder are considered most of them fall into the basic category. The problem could be with quality in some villages, predictability or even low pressure in others. To complement poor service levels from the public systems most households depend on unprotected multiple sources. The official norms under the definition of water security consider even the unprotected sources as part of normal service as long they are within the prescribed distance (500 meters) from the household. The new guidelines (GoI, 2010),in a way, further dilute the norms especially in conditions of scarcity, saying that the 40 lpcd norm could be flexible. In other words, drought-prone regions could be categorised as getting normal service levels even when they receive less than 40 lpcd, as the official norm could be below this level there. This seems a regressive step for guidelines that are, in general, progressive.

III ANALYSIS: COST OF PROVISION, DISAGGREGATED COST COMPONENTS

Fixed Costs (CapEx)

The time span of schemes vary across the villages; they are between 7 and 40 years old with an average of 25 years duration in both the zones. Timelines of WASH capital expenditure (CapEx) in these villages indicate that the pattern and frequency of capital expenditure vary across villages. At the aggregate level, the current value (2008-09 prices) of cumulative capital expenditure (CapExHrd) incurred over the years varies between US$45 per capita in CTZ to US$ 53 per capita in STZ (Figure 2). Households also incur capital costs to the tune of US$ 4.1 to US$ 4.5per capita in the respective zones. These costs cover overhead or underground storage, repairs to motors, etc. On the whole, total CapEx costs are in the range of US$ 49 - US$ 57 per capita. Variations between the zones could be mainly due to the time span of the schemes, as annualised costs indicate no differences between the zones (Figure 3).

[7] WASHCost Working paper 2 - *Ladders for assessing and costing water service delivery* explains this concept. It can be found on the WASHCost website on http://www.washcost.info/page/196

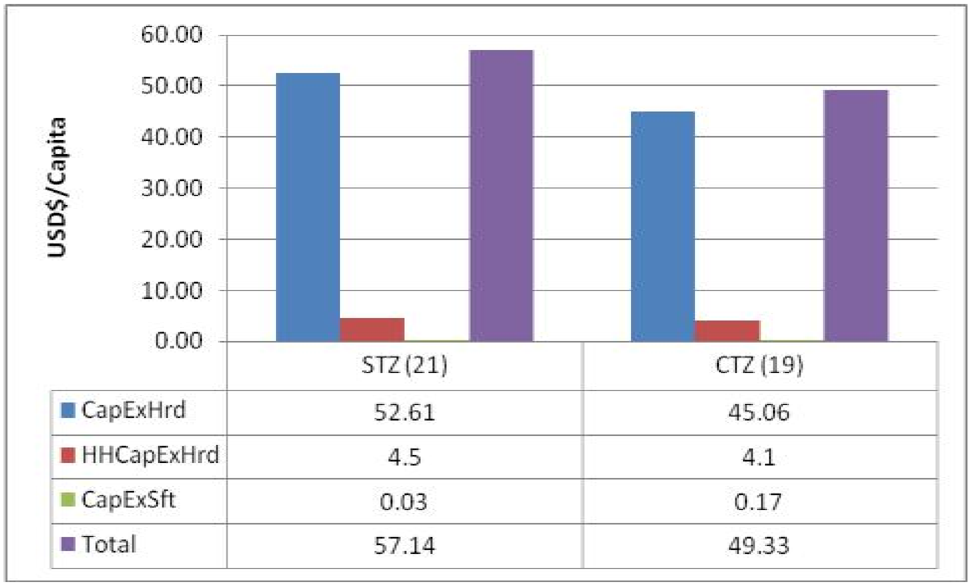


Figure 2 Fixed Cost of Provision by Agro-climatic Zone (USD$/Capita)

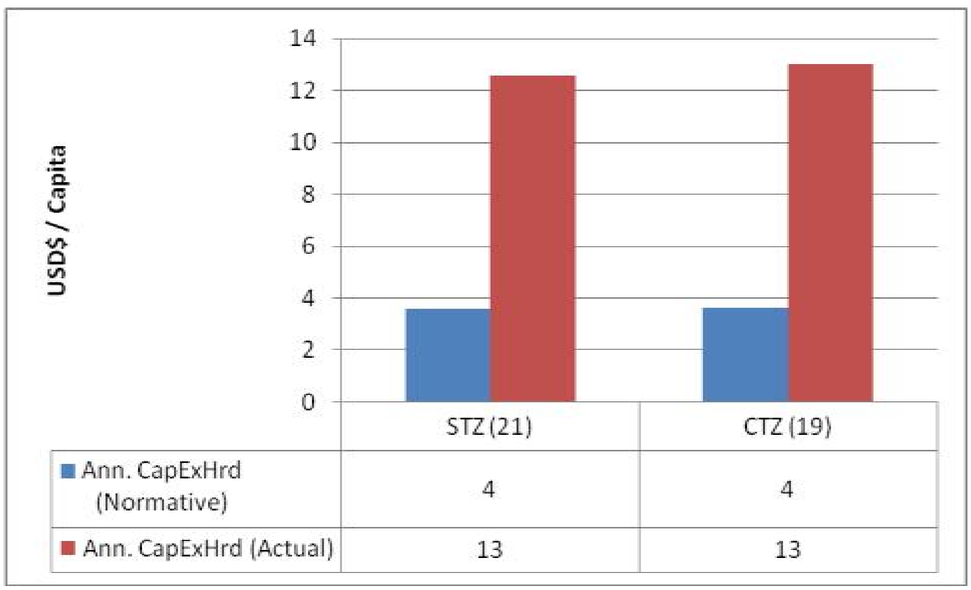


Figure 3 Annualised Fixed Cost of Provision by Agro-Climatic Zone Compared with Normative Costs

Annualisation is done on the basis of normative life spans and on the basis of the actual life span of the components. The reason for annualising fixed costs[8] is to make costs comparable across villages where schemes vary in terms of age (number of years since the beginning of the water supply scheme). Figure 3 shows dramatically that the actual annual costs are more than 3

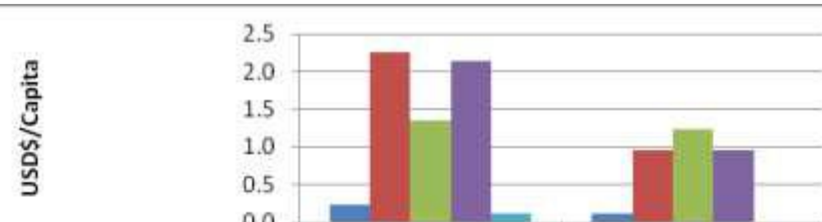
[8] We have not annualised the HHCapExHrd, as we do not have the actual life span figures for these investments.

times higher than normative annual costs in both zones; US$ 13 to US$4 per capita. This is a factor of the actual life span being far shorter than the normative life span and indicates that the need for rehabilitation and replacement is more frequent than usually assumed or prescribed. This could be one of the reasons for the frequent ad hoc investments at the village level with new CapEx replacing CapManEx – i.e. new construction rather than rehabilitation.

Within the zones the cumulative CapEx costs (from inception till 2008-09) vary between US$ 16 and US$103per capita (in 2008-09 prices). Variations between sample villages in cumulative costs are relatively less in STZ. In the case of annualised costs (normative as well as actual) the variations are more in the STZ when compared to CTZ. In the case of expenditure on software components, the majority of villages reported no expenditure at all, indicating the low importance given to planning and designing. This brings out two important points: i) capital expenditure is mostly allocated to infrastructure to the neglect of planning and designing aspects of the systems; ii) existing lifespan norms for systems do not seem to be realistic, as far as these two zones are concerned. This calls for revisions in the allocations that are made for rehabilitation and replacement, which are totally absent at the moment.

Recurrent costs

Recurrent costs are the expenditure needed to operate and maintain the service on a regular basis without interruption. It is the responsibility of the service provider to maintain serviceability through proper upkeep of the systems. These costs include capital maintenance (CapManEx), Operational expenditure (OpEx) and direct and indirect support (ExDS and ExIDS). In reality household also spend on OpEx though there are wide variations between the zones (Figure4). These costs are mainly for buying water. Households also incur opportunity cost of time as they spend substantial amount of time in fetching water. However, we have not included these costs in the present analysis as we are dealing mainly with financial costs (some data is presented in the next sections). The recurring costs range between US$ 4 in CTZ and US$ 6 in STZ (Figure 4). The recurring public spending is mainly in the form of OpEx and CapManEx. The variations in recurring costs across sample villages are substantial in the case of some components such as the household costs of buying water.



	STZ (21)	CTZ (19)
CapManEx (Normative)	0.2	0.1
CapManEx (actual)	2.3	1.0
HHExDS	1.4	1.2
OpEx	2.1	1.0
HHOpEx	0.1	0.0

Figure 4 Recurring Costs of Provision by Agroclimatic Zone (US$/Capita/year)

In order to get the total expenditure per capita per year for the present level of service, we have annualised all the costs (including CapEx) using the actual life span. Direct support costs in the form of buying water at household level are already included in the financial cost of provision, since, in the absence of these household costs, the existing household level of service would be below the requirement. The relative shares of different cost components vary between the zones. While CapExHrd accounts for 56 per cent of the annual expenditure per capita in STZ, it accounts for as much as 63 per cent in CTZ (Figures 5 and 6). HHCapExHrd is the second largest component at 19 and 20 per cent in the respective zones. The share of CapManEx ranges between5 and 10 per cent while the share of OpEx ranges between 5 and 9 respectively in CTZ and STZ. HHExDs accounts for 6 per cent of total expenditure per capita in both zones. If only the public expenditure is taken into account, CapEx takes major share followed by CapManEx in both the zones. This again indicates that an important component of actual cost (CapManEx) is not part of the cost estimates.

(per capita per year in percentages)

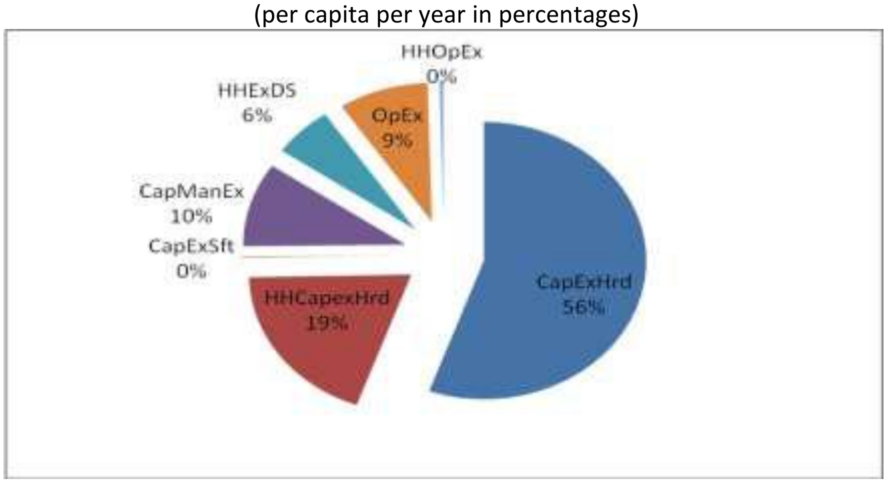


Figure 5 Relative Costs of Provision in Southern Telangana zone

(per capita, per year, in in percentages)

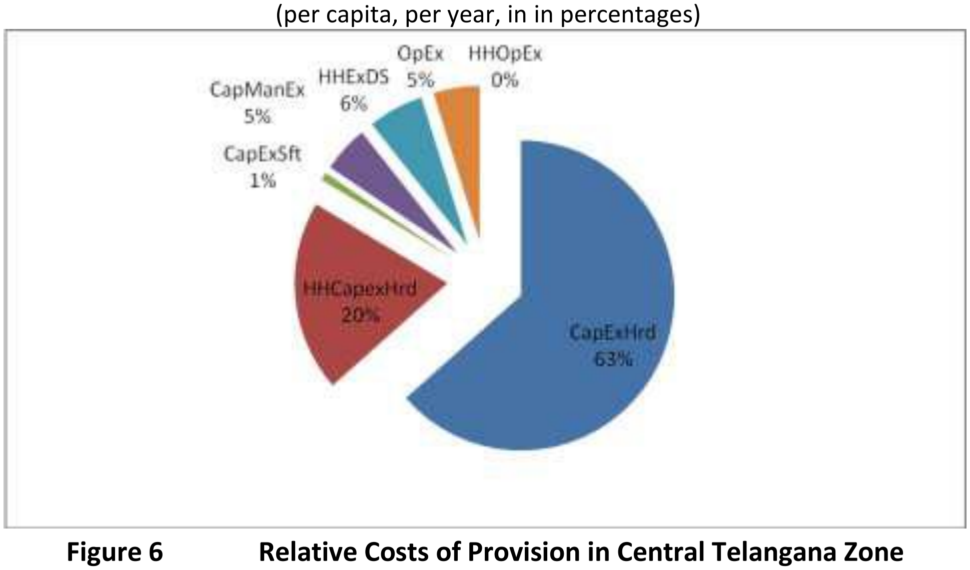


Figure 6 Relative Costs of Provision in Central Telangana Zone

Analysis of actual expenditures vs. governmental guidelines

The preceding analysis brings out clearly that households spend substantial amounts (about 25 per cent of total costs) to complement the public service delivery. Further the entire public expenditure is allocated towards three components viz., CapExHrd; CapManEx and OpEx, with CapExHrd accounting for more than 80 per cent of total expenditure (Figs. 5 and 6). Expenditure for CapManEx is not planned. CapManEx should be included as a depreciation charge in the accounts to provide funds as needed, but without that facility, the systems are not maintained and the actual lifespan is much lower than the normative life span in most cases. And this does appear to be the case. As a result CapManEx is often spent in an ad hoc manner. Though the new guidelines propose six components that include CapExSft (GIS-based planning, etc.); source sustainability; water quality and natural calamities, CapManEx is not included. While the guidelines indicate relative shares for these components, they do not provide any specific amount in absolute terms or on a per household or per capita basis. Here an attempt is made to estimate the per capita expenditure given the present official cost estimates. As per the Andhra Pradesh Rural Water Supply and Sanitation Department (APRWSS) the annual costs are US$ 91per household or US$ 22 per capita. This entire amount is spent on hardware with a normative life span ranging from 10 to 15 years. As we have seen in our estimates, the actual life span of the systems is much less.

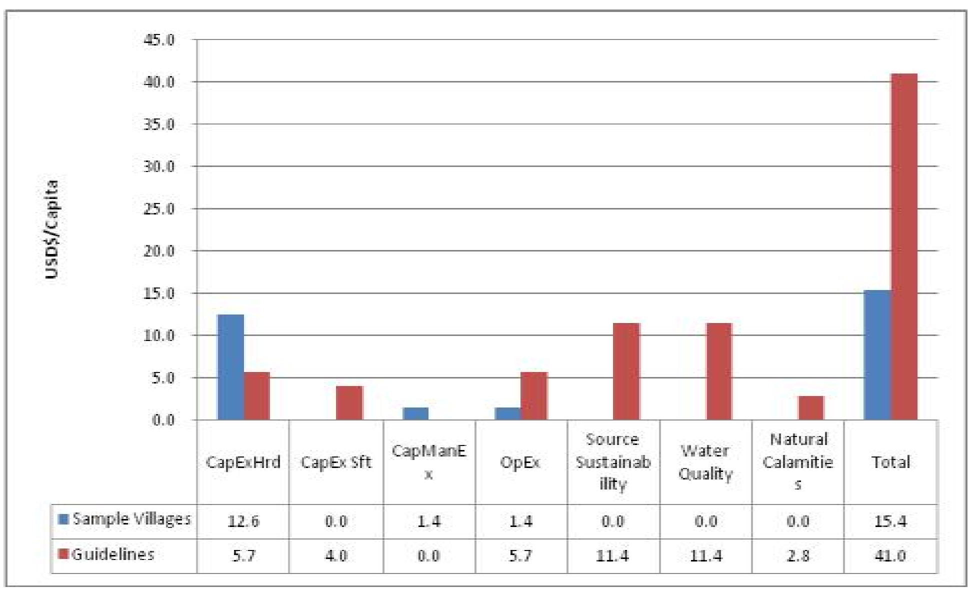


Figure 7 **Estimates of Annualized costs - Actual vs. New Guideline Norms**

Using the normative allocations (proportions) provided in the guidelines and present norm of APRWSS (the US$ 22 per capita that is being spent on CapEx) we have estimated the normative cost of provision if all the components in the guidelines were to get their respective allocations. We have estimated the annualised costs using the relative allocations provided in the guidelines (Figure 7). While the CapExHrd allocations are annualised using the actual life of the components , other components like source sustainability, water quality, etc., are assumed to be recurring as these components need regular attention. It may be noted that there is no cost component relating to CapManEx even in the new guidelines. The estimated total annual costs are to the tune of US$ 41 as against the actual costs incurred in the sample villages of USD$ 15 (Figure 7). Even if the allocations towards source sustainability and water quality components were to be annualised using the actual life of the components, the total cost of provision would be about US$ 25 per capita per year. The difference between the actual cost of provision in the sample villages and the estimated cost of provision as per the guidelines is the shortfall in expenditure based on current guidelines. However even this does not provide the actual expenditure gap since the guidelines do not include all the costs, such as CapManEx, and hence do not reflect the ideal costs. Public spending on rural drinking water falls short of the roughly required allocations for providing sustainable service delivery. The shortfall is in the range of US$ 9 (when all the components are annualised) to US$ 25per capita per year. The difference is presently being met by the households in the form of buying water or spending more time in fetching water to overcome the poor service delivery. Households spend anywhere between US$ 8 and US$ 23 per capita per year when both buying and the opportunity cost of time are included, which matches the expenditure shortfall.

This clearly indicates that allocations towards rural drinking water are well below the required allocation levels for providing water service delivery. This gap is coupled with the sole allocation of public funds towards infrastructure to the neglect of other components like source sustainability[9], water quality, natural calamities, operational expenditure, etc. These factors are at the root of widespread slippage in the rural water supply services. Though the guidelines provide normative and relative allocations they do not look at the actual costs and requirements.

Estimates provided in this paper and the results from the WASHCost project at a broader level will provide inputs for operationalising the guidelines. *Prima facie,* the analysis suggests that budget allocations to the sector need to be revised with due allocation towards other important components like CapExSft; source sustainability, CapManEx, water quality, etc., as there is no substitute for these investments in meeting the objective of sustainable service delivery. The LCCA framework facilitates our understanding that these enhanced allocations need not come at one point in time, as expenditure towards source sustainability, water quality, etc. could be staggered over the years. However, the LCCA prompts the need for proper planning and design prior to the implementation of schemes, so that allocations can be more efficient and ad hoc and wasteful expenditure can be avoided.

IV KEY FINDING AND CONCLUSIONS

The cost estimates using the life-cycle costs approach framework bring out the following important issues:

[9] Source sustainability here refers to various activities that are taken up to protect the source. These include for instance catchment treatment, watershed treatment, etc. in the case of surface water sources and creation of replenishment mechanisms like percolation tanks, injection wells, groundwater sanctuaries, etc. in the case of groundwater sources.

a) Unit costs revealed by the LCCA are substantially higher than the prescribed norms.
b) In both cases (prescribed norms as well as our estimates) infrastructure costs take the lion's share, while the other important components are being neglected.
c) The present official norms and estimates for rural drinking water cover just one component (access/CapEx) of the five suggested in the guidelines. As a result the allocations appear to be underestimates when compared to the norms set under the new guidelines, even though the guidelines themselves do not cover all the components of LCCA that are required for sustainable service delivery. While the guidelines are a step in the direction of improving service delivery, they need to be more inclusive in incorporating some of the important components like CapManEx.
d) There is need to revising the allocations to the sector in terms of magnitude and composition i.e., moving away from the present pumps and pipes (infrastructure focused) approach to more rational allocations towards source sustainability, water quality, CapExSft and governance aspects.
e) Though service levels in the sample villages are good at the aggregate level, a considerable number of households get less than the normative service within the village. As a result households end up spending substantial amounts to supplement the service levels.

In conclusion, this paper calls for a rethink in the policy strategy towards rural water supply in India. There is need for a paradigm shift in terms of developing a comprehensive and realistic costing mechanism that address various aspects of drinking water like slippage, water quality, etc. LCCA is one tool that can help in achieving water security at household level. Source sustainability or source protection, water quality, capital maintenance, operational maintenance, etc., are all aspects of service that are integral to the LCCA. It facilitates a fairly comprehensive planning, or at a pragmatic integrated water resource management approach to WASH service delivery. Once the comprehensive planning is in place and investment priorities are identified, then investments can take place in a building block approach as against the ad hoc investments at present.

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