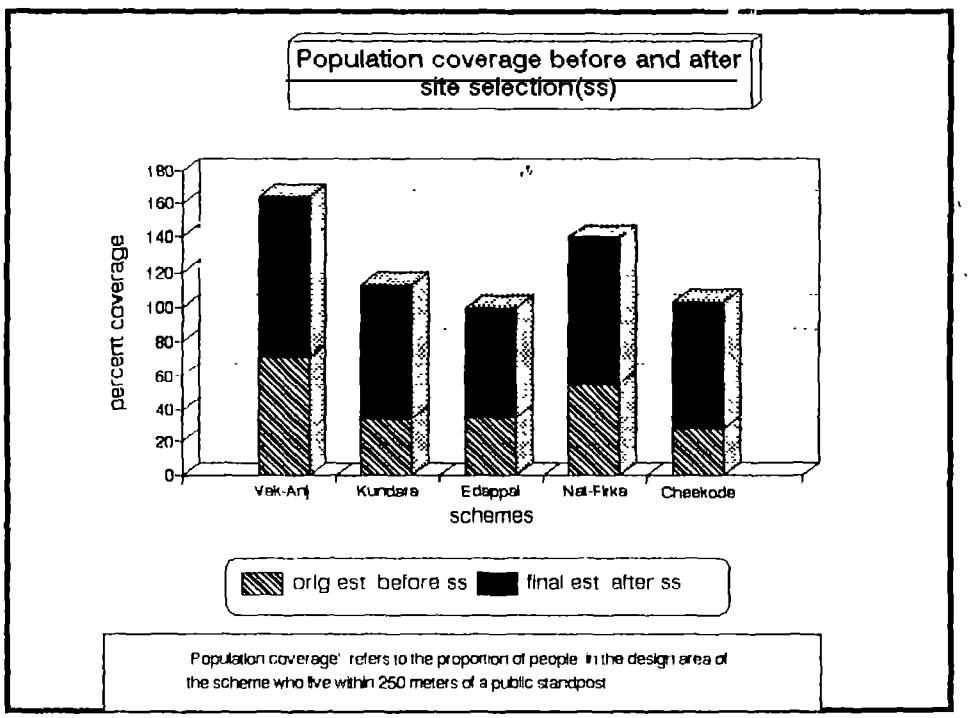
LOCATING PUBLIC STANDPOSTS WITH THE COMMUNITY:

THE IMPACT OF SITE SELECTION PROCEDURES ON WATER SCHEMES IN KERALA



Socio-Economic Units
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LOCATING PUBLIC STANDPOSTS WITH THE COMMUNITY: THE IMPACT OF SITE SELECTION PROCEDURES ON WATER SCHEMES IN KERALA

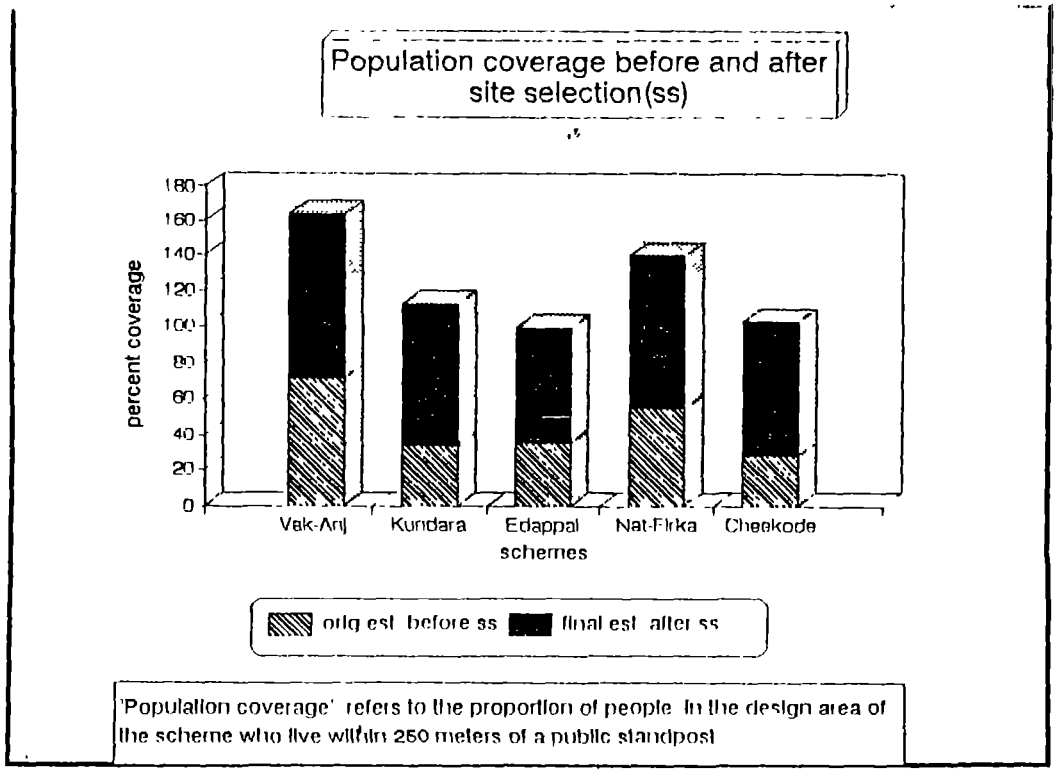
1. The Kerala Water Authority is implementing 11 drinking water schemes with the assistance of the Governments of the Netherlands and Denmark. The eleven schemes are scattered in rural areas throughout the state of Kerala. Altogether, they are meant to cover about 1000 square kilometres where 1.5 million (15 lakh) people live. The schemes seek to provide safe and reliable drinking water through piped distribution systems to public taps(standposts) and household connections

2. The Kerala Water Authority (KWA) designed and implements these schemes. Working with the KWA, are the Socio-Economic Units(SEUs), which were organized in 1987/88 and carry out water and sanitation activities with the communities.

3. In these schemes, the public standposts are meant to provide water particularly to those people who can not afford private household connections; that is, they aim to serve the poorer population The schemes were originally planned in the early and mid-1980's. Some distribution systems had been partially constructed when it appeared that public access to piped water would be less than expected. In other words, a significant proportion of the households were not located within reasonable walking distances to a pipeline.

4. Therefore, beginning in 1988, more accurate maps were made of the scheme areas (at 1.5000 or 1·4000) showing roads, paths, houses by economic level, and so on. Then, selection of locations for public standposts was done with the communities and, based on this, extensions were approved for the distribution systems. At its simplest, site selection for public taps mobilises surveyors together with ward members and/or ward water committee members who go to the areas where the maps show sufficient numbers of houses. They call people from their houses, discuss the need and responsibilities that are implied in having a standpost and the criteria for locating standposts If the potential users need a standpost, they determine the best location together. This usually takes 20 to 45 minutes to 1 hour. The panchayats (local government) then approve the locations, giving an undertaking to pay for the taps. The KWA checks the location for technical feasibility. This process, has resulted in a much higher level of coverage and service.

5. The concept of coverage was more specifically defined, in 1990, as the proportion of the population within 250 meters walking distance of a standpost This criterion was approved by the Coordinating Committee which oversees the Danish and Netherlands-assisted schemes. The difference in population coverage between the original and final plans (called in this paper, the <u>original</u> estimates and <u>final</u> estimates) are shown below



6. As the preceding graph indicates, population coverage by public standposts increased significantly because of systematic mapping and site selection procedures. Concretely, this means that women must walk less than half a kilometre to bring a pot of drinking water to their homes. It should be noted that the process of site selection does not lead to a pre-determined level of coverage of, for example, 90%. Using specific distance and density criteria means that the level of coverage will differ in each scheme, as a function of the distribution of the population and as a function of the demand for piped drinking water. It therefore is not possible to determine without prior investigation that a scheme will serve 90% of the population, a goal stated in most of the original plans approved for the schemes.

Mapping and Site Selection Procedures

7. Traditionally, the old procedures for identifying the locations for public standposts begins with the laying of pipeline on some or many of the main roads. As the scheme is being implemented, a letter is sent to the panchayat indicating the number of taps allotted to that panchayat. This is discussed among the elected officials who then decide the location of the tap points, often without visiting the areas where the lines are being laid. The panchayat then informs the KWA accordingly. There are also special provisions, annually or periodically, for small schemes or line extensions (such as the 'drought schemes' or provisions for backward groups) and there are occasional requests for extensions and requests for standposts from special interest groups such as politicians. There is no known distance/density criteria for the placement of standposts. As a result of these procedures, the actual coverage is rather low; many standposts are located on paved roads away from where many poorer populations live

8. The new procedures that have been used to prepare final plans for these eleven schemes are criterion-based. When the standposts are identified according to specific criteria, this will also define the distribution network: where and how much pipe will be laid The site selection procedures specify·

A. service criteria Focus on areas that can not afford private connections Priority to water-deficit areas with poor households

B. distance criteria· One standpost to serve a minimum of 15 to a maximum of 40 houses within a walking distance of 250 meters.

C. physical criteria: ensure good drainage, avoid water-logging on platform and surroundings Avoid putting standposts in areas too close to roads and pathways that will be obstructive to traffic. Technical feasibility must be checked by KWA before location of standpost can be approved.

D. utility and financial criteria: Locations and number of standposts must be approved by users, by the Ward Water Committees and the panchayat, with indication of the willingness of the panchayat (and sometimes the users around the standposts) to pay for the standposts An amount of Rs. 875 is currently charged for each standpost per year to the panchayat

Exceptions· Special exceptions below the level of 15 households per standpost, must be approved separately. Any deviation from these norms must be approved by all concerned: the KWA, the SEUs, the WWCs and the panchayat.

9. The main steps of these site selection procedures are:
   A. PREPARATION OF MAPS AND COLLECTION OF DATA
   B PRELIMINARY SITE SELECTION
   C. FINAL SITE SELECTION

10. Each of these steps or components is meant to serve particular purposes. This is to say that each step has its own expected output:

A. PREPARATION OF MAPS AND COLLECTION OF DATA at a scale of 1:4000 or 1:5000

-to be used for design of distribution net
-for implementation of the distribution system by KWA and contractors
-for preparation of as-laid maps to be used by KWA staff and contractors in operation and maintenance

B PRELIMINARY SITE SELECTION

-preliminary identification of standpost locations for the design and implementation Simply put, the pipes and public standposts should be near the people they are meant to serve. The distribution network should reach the greatest proportion of population in need at the lowest cost per capita
to coordinate with implementation of the scheme. Thus, it is best not to try to finalize the location of standposts with the community too early if the system will not be installed for many months or years.

C. FINAL SITE SELECTION involves the community, including women, in final selection of sites, to incorporate their needs so as to ensure.

-good service from the point of view of the consumers
-the good maintenance of standposts by consumers
-helps set up an effective community reporting system for faults and leaks
-location of standposts for good drainage, ease of O&M
-preparation for cost recovery, selection of standpost attendants and so on.

Involving the community, not just a few individuals from the panchayat, improves subsequent maintenance of the scheme and can stimulate cost recovery

11. The preparation of the maps and preliminary site selection is often done closely together In earlier years the preliminary and final site selection were done together. But this was not entirely satisfactory. It meant that after determining the exact location of the standposts, sometimes years went by before pipelines and standposts were implemented. During this time not only are complaints received from communities asking when the schemes will be completed, but there are also population shifts...which have had to be examined later Now the preliminary and final site selection are separated with final procedures taking place just before laying of small lines.

12. The cost of mapping and site selection per panchayat is very modest, ranging from Rs 21,000 to Rs 50,000. Total time required is about two months to two-and-a-half months for each panchayat, including the production of good base maps. Cost of taking the hydraulic calculations is about Rs 20,000 to Rs 50,000 per panchayat. Total cost of preparing the base maps, site selection and hydraulic calculations, is less than one lakh rupee per panchayat This is a very small proportion of the total cost of a scheme. The major challenge of these procedures is not the lack of funds, but the availability of flexible manpower and the management capacity

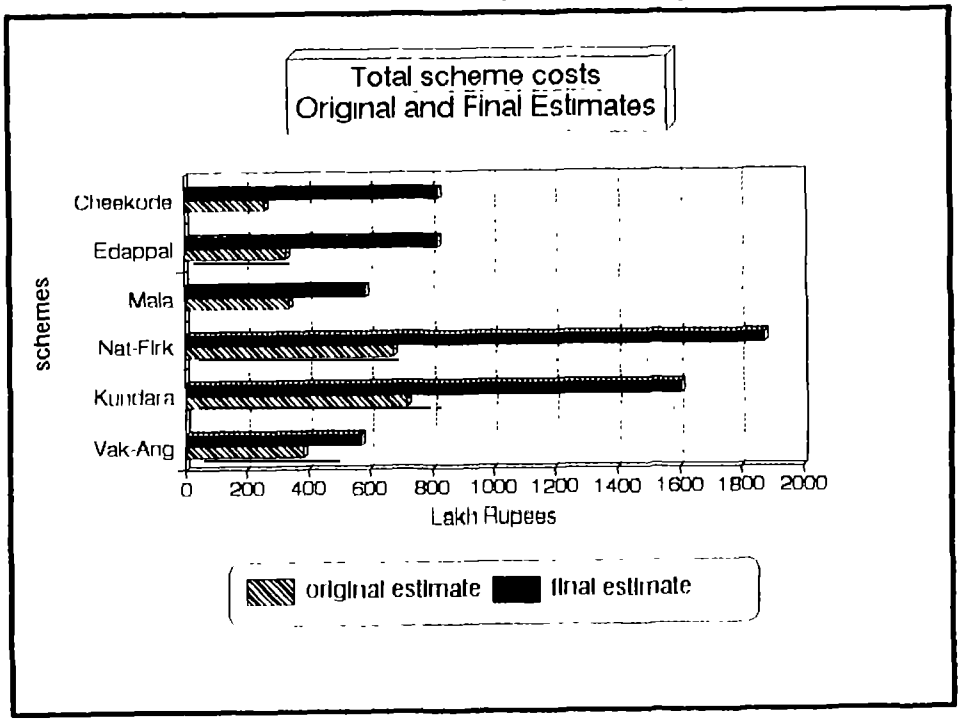
DATA

13. The remainder of this paper investigates the extensions to the distribution systems which result from the site selection and mapping procedures. It investigates the impact, principally financial, of the process of site selection of public standposts. It looks at six schemes: Vakkom-Anjengo, Kundara, Mala, Nattika-Firka, Edappal, Cheekode In order to prepare the paper, data was taken from the census and the approved estimates for each scheme. Both the KWA and the donors kindly supplied information about instalments and reimbursements Some of the financial data from early years was not directly available and some data on reimbursements differed among the different sources

14. There are several problems in analyzing and interpreting the data, however As noted above, the original plans were approved by the donors and were being implemented when it was decided to investigate the level of coverage. In a few cases parts of the distribution systems had already been laid and the new distribution systems were inter-linked with older, existing schemes. This means that

it is not possible to demonstrate the impact of the site selection procedures during the early design stage on all the schemes. In three schemes (Mala, Nattika-Firka, Vakkom-Anjengo schemes), many pre-existing distribution lines from earlier schemes have been interconnected. Thus, for these schemes, the total costs of providing drinking water are higher than shown in the following graphs because the costs of the inter-connected systems have been omitted as this information was not available. Therefore the reader should examine the patterns, rather than the particular data for these schemes.

15 Keeping these qualifications in mind, the following table shows total costs for six schemes. The original estimates are the plans as approved by the Government of India and the donors in the early and mid-1980s. The final plans (estimates) were approved during or after 1990



16. The increase in costs from the original to the final estimates come from three sources.

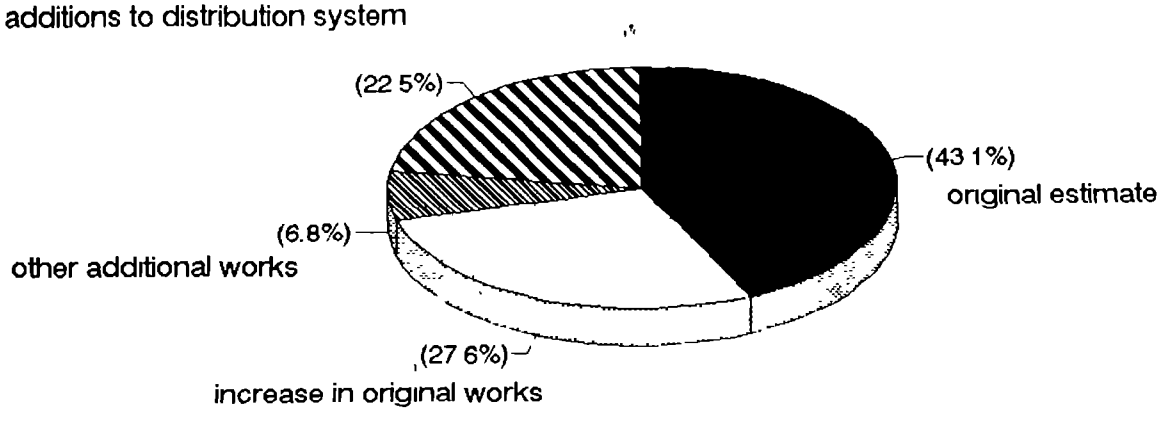
-price increase in original works due largely to inflation, early underestimation, delays in implementation

-other additional work which had not been foreseen such as the purchase of standby pumps

-extensions to the distribution system and to related works needed to support the expanded distribution system

Of these three items, the last (extensions to the distribution net) is a direct result of the site selection and redesign procedures being discussed here. It is interesting to note that these extensions account for less than half of the price increase from the original estimate to the final estimates of these schemes, as is shown in the following graph. In this graph, the black section represents the total cost of the original estimates (43% of the total). Price increases in the original works account for 27% of the total, an increase of more than half the original estimate.

Six schemes: total costs



'DESIGN' and 'COVERED' population

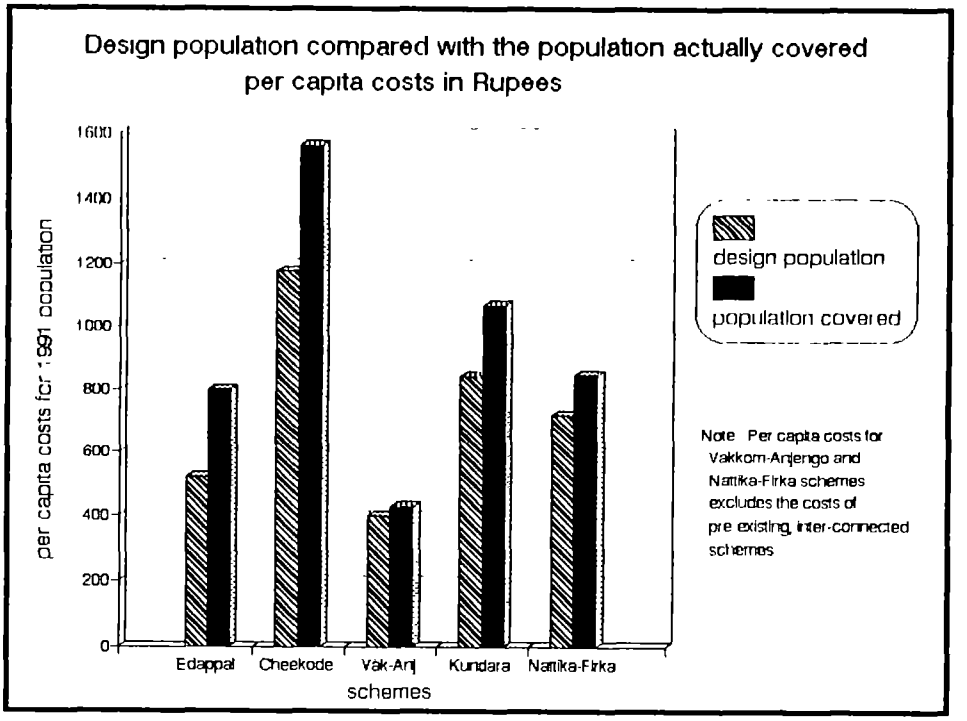
17. The costs of the construction of a scheme are more meaningful if viewed in terms of the cost per person served Costs per capita are commonly calculated for the design population This is the total number of people living within the area of the scheme. This means, for example, all the people living in the 10 panchayats of Nattika-Firka scheme. However, calculations based on the 'design population' are not meaningful if large numbers of people lack access to the water supply In Kerala, if the standpost is located so that a woman has to walk more than half a kilometre for a pot of water, she will probably decide to use an alternative source possibly of less quality She would not be covered by the distribution system Per capita costs, therefore, should be based on the cost per person actually served. The population served or the population covered is, as explained earlier, is considered to be the number of people within the design population who live within 250 meters of a standpost The per capita costs for the design population and the population served will only be the same if the distribution system serves 100% of the population in the design area. In none of the schemes does the distribution system serve 100% of the people. This is because of

(a) technical reasons (that is, the water would not reach the area),

(b) population density and distribution (that is, the population was so widely dispersed that there were not 15 houses within 250 meters or the population lives in isolated pockets which can not be economically reached by a pipeline),

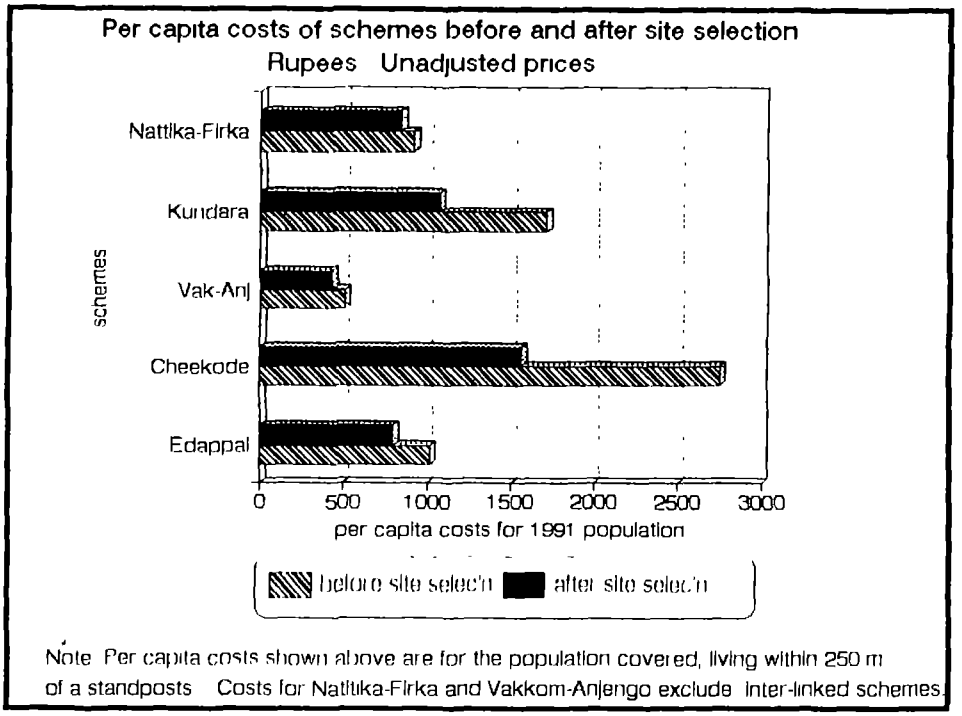
(c) traditional water sources are very good and the householders do not want a standpost.

18. Average per capita costs are lower for the design population than for the population actually within the design area. In the following chart, note that the data for Kundara is approximate as final site selection in on-going. Costs for Vakkom-Anjengo and Nattika-Firka are lower than reality, excluding the costs of earlier lines interconnected with the new schemes



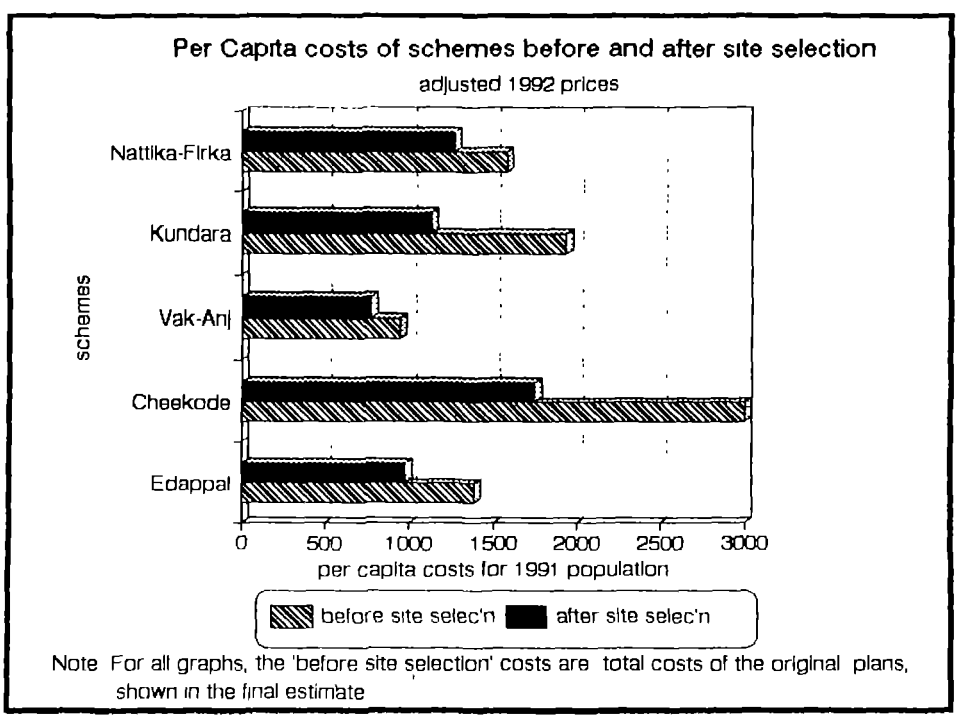
Site selection and per capita costs

19. When more of the population is covered by a distribution system, obviously the per capita costs decrease, all other things being equal The following chart shows the per capita cost for the people covered in the original design (original works including price escalation)
With site selection, coverage increased by about 20% in Vakkom-Anjengo scheme, 30% in Edappal, 35% in Nattika-Firka and 45% in Kundara Therefore the final design gives lower per capita costs even though there were additions to the distribution system. As the chart shows, improving the service did not increase the cost per person actually served.



Note Per capita costs shown above are for the population covered, living within 250 m of a standposts Costs for Nattika-Firka and Vakkom-Anjengo exclude inter-linked schemes

20. Funds required for construction of the original works of each scheme tended to be expended in the first years of a scheme After that funds for the additions to the distribution net been used Functionally this means that relatively 'expensive' rupees were used for the original works The yearly actual expenditure and costs of the schemes were standardized using an index for manufactured goods, based on 1992 prices. This means that the difference between per capita costs before and after site selection are greater when prices are adjusted as shown below Please note, in this graph, that the adjusted costs for all schemes, (but especially for Kundara where major construction is still outstanding) will increase if construction is delayed.



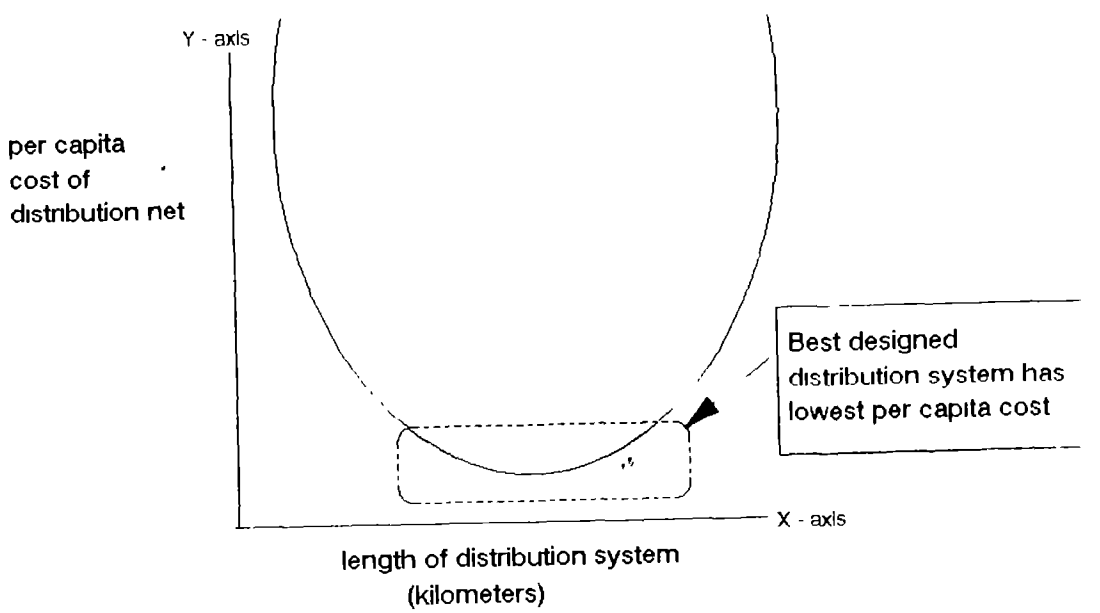
Note For all graphs, the 'before site selection' costs are total costs of the original plans, shown in the final estimate

21. The proportion of the population served increased by different amounts for different schemes after site selection One might expect that the increase in population coverage would be roughly proportional to the extensions of the distribution system and to the per capita costs of the distribution system. The following table examines this:

scheme	% additional coverage after site selection	per capita cost of additions to distribution system
Vakkom-Anjengo	20%	Rs. 75
Edappal	30%	Rs 218
Nattika-Firka	35%	Rs 185
Kundara	45%	Rs 222

22. This table shows that an additional 20% of the Vakkom-Anjengo population was covered at an approximate cost of Rs 75 per person served The increase of 30% coverage in Nattika-Firka cost about Rs 185 per person served One might ask, is there a way to determine what will be the smallest expenditure for a distribution net that will result in the greatest increase in coverage in a scheme.

23. Of course, theoretically there is a design for the distribution system that minimizes costs for the population actually served. In other words, if the distribution system is too small within the design area, then a relatively small proportion of the population is served and the per capita costs will be high. If, on the other hand, the distribution system is over-designed, then some lines are extended uneconomically to reach relatively few households. In this case, also the per capita costs for the population covered will be relatively high Theoretically this relation can be shown as a parabola



24. The site selection exercise is meant to help maximize population coverage while minimizing the cost of the distribution system. But how could one select a new scheme or determine the optimum length of the distribution system in advance of detailed site selection? One might assume, for example, that because coverage is a function of population distribution, then per capita costs will be lower for schemes with high population density. In other words, the greater the population density, the lower the per capita costs for construction of a scheme. Unfortunately, with so many factors involved, it does not work out this simply For example, for Mala scheme, which has low population density and undulating terrain, per capita costs are, surprisingly, much lower than in either Nattika-Firka or Cheekode, both of which have high densities over flat land. Some factors effecting the per capita costs, in addition to the population distribution are: distance to the source and type of sources, cost overruns, amount of interconnection with existing schemes, the type of technology selected for the scheme, the speed of implementation (delays cost more), and so on.

Benefits of the site selection procedures

25 The Socio-Economic Unit based in Calicut has made a list describing the benefits of the site selection procedures in the drinking water projects. This list, with a few additions, is quite appropriate:

- improved service to population, particularly those in need Needy areas and households are not left out. They are served by public standposts

- lower per capita costs for the population actually served.

- Users are consulted and the problems of the area (such as drainage, lack of space) can be taken into account

-Because the site selection procedure ensure comprehensive coverage, it minimizes the need for future extensions to serve 'omitted' populations

-The site selection process initiates community participation. It can be used to begin informing the community responsibility for:

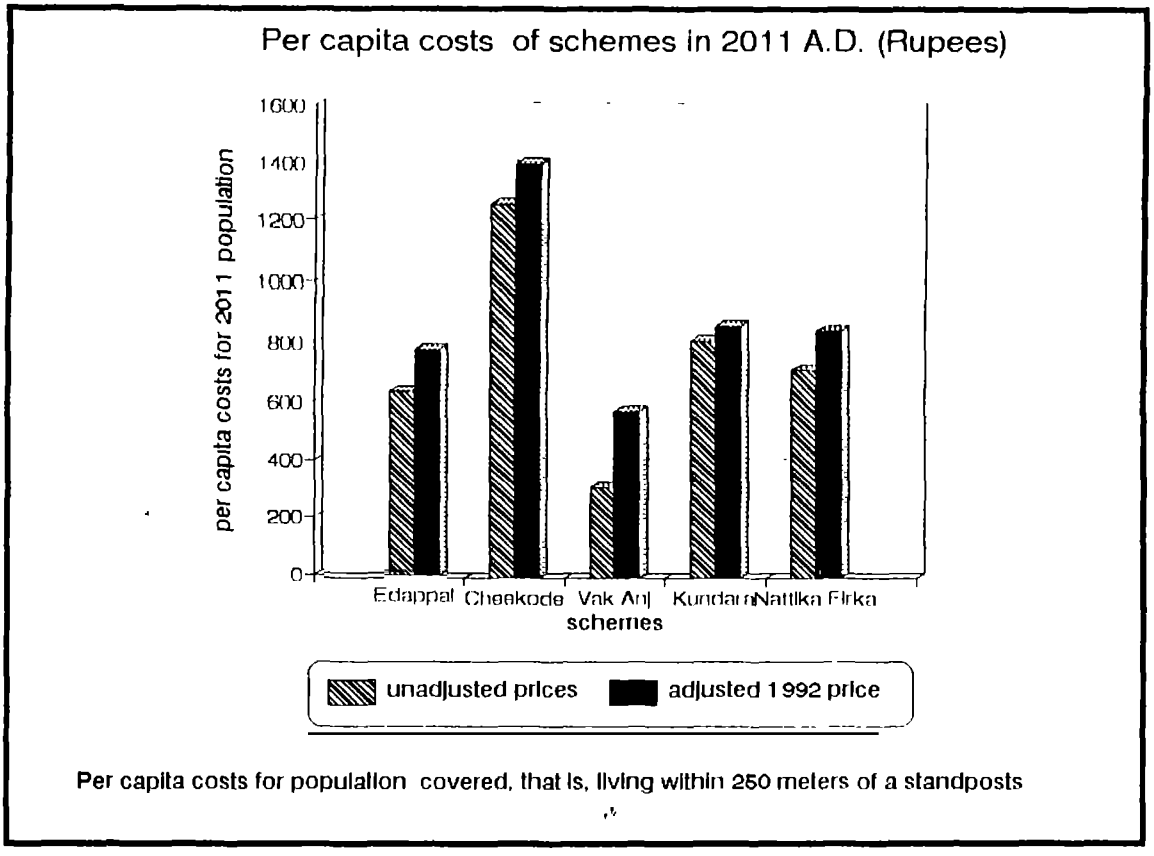
1-reporting faults and leaks to KWA
2-making the community aware that standposts must be used appropriately
3-starting to motivate people that drinking water is not a free commodity, it must be paid for to ensure good service in the future.

-The site selection procedures make it easier to complete land releases and land acquisition for small pipelines and standposts. Community members feel that the scheme is theirs; they have had a hand in defining the distribution system.

-Because the procedures are done throughout the scheme at fixed times, using concrete coverage criteria, much of the political pressure that leads to uneconomic and undeserving lines/standposts, is eliminated

26. As an aside, it can be seen that the per capita costs of these piped water schemes are higher than the GOI guidelines for the implementation of drinking water schemes. It should be remembered, however, that the guidelines were prepared based on somewhat different assumptions: handpumps and clustered populations Even if the O&M systems are operating well for the handpump-borehole systems, the lifespan of small handpump systems is shorter than that of piped water schemes Current drinking water schemes in Kerala are being developed for the design population in the year 2011 AD This will be at least two and probably more than three times the life-span of most hand-pump schemes On the basis on the number of operational years, the GOI per capita investment guideline of approximately Rs 400 for Kerala might be doubled, or more than doubled to be comparable From this point of view, the per capita costs of these schemes is comparable The following table shows

the per capita costs of selected piped water schemes for the estimated population in the year 2011 AD. These costs are also adjusted using 1992 as the base year for prices. The adjustment gives a better approximation of actual costs.



Per capita costs for population covered, that is, living within 250 meters of a standposts

SITE SELECTION PROCEDURES IN DETAIL

A. PREPARATION OF MAPS AND DATA COLLECTION

1. At the beginning of implementation, or preferably during the design phase, the project is introduced to the panchayat and local groups such as youth clubs, ICDS, mahila samajan.

2. Data is collected to prepare base maps and provide strategic information about populations in special need. This data comes from the panchayat and land use record maps, the block office and so on. Existing maps are generally not up to date. Aerial maps require considerable extra work to interpret given Kerala's tree canopy.

3. The area is thoroughly surveyed to produce base maps which accurately place roads, paths, landmarks. This has been done for 1 scheme by the Kerala Water Authority, for another scheme by an engineering college and for 8 schemes by the Socio-Economic Units. The Socio-Economic Units visit all areas and, with panchayat members and/or Ward Water Committee members, complete the maps showing houses, by three economic levels (poor, medium, richer) as well as institutions and special groups (ICDS, schools, clinics, colonies).

4. Base maps are produced. They must be at a large enough scale to contain the information and be useful for subsequent O & M. Currently the scales range from 1:4000 to 1:5000.

5. Socio Economic Units together with the community groups or Ward Water Committees list needy, water-deficit areas, collect information about special health problems and so on. This information can be useful for design as well as for subsequent community education activities.

6. Kerala Water Authority staff measure roads and paths for hydraulic calculations needed for design. If earlier data showing houses and institutions is available, then time can be saved as some areas can already be omitted, which do not have sufficient population or for which there is alternative access.

B. PRELIMINARY SITE SELECTION

1. Approximate sites are selected for public standposts with the community that lives in each location using agreed distance and density criteria for each standpost.

2. In some panchayats and schemes, the Ward Water Committees are set at by this time. Visits are made to all areas identified using the maps and earlier collected data. Discussions should be held with the potential users, especially the women the verify information. The need for piped water should be taken into account at this stage, not only later. In a few schemes the tentative sites for standposts has been done without consultation of the local community, based only on population criteria and the design map. This is not the most desirable approach.

3. Design of the distribution system in completed by the Kerala Water Authority. this must take the preliminary site selection into account. The maps should be checked by senior engineers and by the officers who participated in the site selection activity. This avoids errors which are only discovered at a late date.

C. FINALIZATION OF SITE SELECTION

1. Visit proposed areas and decide on the exact location of the standpost with the future users, especially the women, using the site selection criteria. Users almost always select the best locations themselves. Users must be informed that the standpost is still tentative, subject to its technical feasibility

2. Check boundaries and landmarks, Enter location with signatures of some of user group on peg sheets to be used by the KWA and the contractors.

3. If considerable time has elapsed since the base maps were produced (which can be as much as 3 or more years), then each part of the panchayat should be revised to make corrections due to population movement in the intervening time.

4. Obtain land release, using correct forms, if needed. Generally land release is given particularly as the decision is made by a group of people who know each other.

5. Technical feasibility of the prospective standposts are checked by the KWA staff. For standposts that are not technically feasible (for example, water pressure would be too low at the location), SEU return to the site with the Ward Water Committee to determine, with the potential users if the standpost can be moved to another satisfactory location.

6. The proposed number and location of the standposts must be approved by each panchayat and sent to the Kerala Water Authority in the form of a panchayat resolution, also indicating the panchayat's willingness to pay for the standposts.

7. Contractors should be assisted in setting up the standposts at the correct locations by the Ward Water Committees and the panchayat. It is important to control that the standposts are set in the correct location after the site selection procedure has been completed.

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	VAKKOM-ANJENGO	KUNDARA	NATTIKA-THIKA	MALA	EDAPPAL	CHEEKODE
1991 population	143200	166000	260600	148900	157300	69961
2011 population	193,700	218,000	357 000	203,800	195,800	86637
area sq km (census data)	57-flat	132 - rolling	137 - flat	141	125	43
density(people per sq km)	2511	1264	1895	1055	1255	1633
range in density	1774 to 2600	1034 to 1706	1369 to 2217	808 to 1085	1109 to 1366	1103 to 2192
capacity	9 7 mld	for 2011 =10 9	20 mld	11 2 mld	10 8mld	
old schemes interconnected	yes	2 schemes	yes	yes	no	no
# standposts set up without site selection	1165	not known	883	625	none but many old schemes	none
standposts to remove	about 387	not known	yes	yes	none	none
# standposts located using site sel'n procedures	219		972	411	754	340
ESTIMATE -LAKH RUPEES						
ORIGINAL ESTIMATE	383	717 5	674	338	330	263
date	1982	1986	1982	1985	1985	
FINAL ESTIMATE	+LA+10%EC	-LA+10% EC	+LA+11 13% EC	-LA+10% EC	-LA+10%EC-cont	-LA+10%EC-cont
date	1990	1992	1990/1991	1990/91	1990	
incr in original works	112	inc redesign intake 404 5	648	61	214	276
additional works	42	484	553	187	273	283
total final estimate	537	1606	1875	586	817	822
distribution net only	34	368	482	75		
ESTIMATES IN 1992 PRICES LAKH RUPEES						
Original estimate	800 2	939 4	1294	550	492	352
final estimate for original works	160 7	364*	1008	61*	253	290
additional works	42	435 6	513*	787*	256	274
total final estimate	1003	1738	2815	75*	1001	916
distribution system only		368*	484			
COVERAGE OF POPULATION						
Original design (%)	71%	34%****	55%		35%	28%
Final design (%)	93%	79%****	85%		65%	75%

*not adjusted as not expended by 9 93 As 40% of water from Kundara goes outside the scheme proper, items #1 - #7 in estimates have been decreased by 40%

** Treatment plant & intake shared with Kodungallur municipality

*** There are many inter-connected schemes that were built earlier These costs could not be included in the data
Therefore actual costs of these schemes is higher than indicated in this data

**** Approximate levels of coverage Will be somewhat lower when final site selection is completed

PER CAPITA COSTS FOR POPULATION COVERED BY SCHEME						
for original works in revised estimate % covered*	71%	34%	55%		35%	28%
Per capita costs of original works	Rs 503	Rs 1713	922		Rs 1017	Rs 2752
For final estimate with additional coverage % of final coverage	93%	(953 in orig est) 79%	85%		65%	75%
Percapita costs 1991	Rs.428	Rs 1070	846		799	1566
PERCAPITA COSTS FOR POPULATION COVERED ADJUSTED IN 1992 PRICES						
For original works						
% covered*	71%	34%	55%		35%	28%
Percapita costs	Rs 945	Rs 1936	Rs 1578		1388	3277
For final estimate with additional coverage % coverage	93%	79%	85%		65%	75%
Percapita cost(1991 pop'n)	Rs 766	Rs 1132	1270		979	1746
Percapita cost(2011 pop'n)	575	862	846		786	1410

* coverage refers to number of people within 250 m of a stand post