CHAPTER 8

CONCLUSION

In view of the growing significance of public water supplies and the need for their economic analysis, this study was directed to an analysis of public water supplies in Bangalore City. In this study, we first examined the need for and the nature of water supplies and reviewed the international, national and regional programmes for the provision of public water supplies. Next we traced the growth of public water supplies in Bangalore City and examined the trends in production and consumption. We then analysed the finances of the Water Board and the costs of water supplies and reviewed the theory and practice of pricing them. We may now state briefly the main findings and conclusions derived from this study on the various aspects of public water supplies.

8.1. Main Conclusions:

Approach to water supplies: Adequate and safe water is a basic need and a human right, a right shared unequally by the people in the developed and the developing countries, in the urban and the rural areas, and by the rich and the poor.

As public water supplies meet this basic need, their provision is a Social Service, and as investment in water supplies mitigates the impact of poverty, it is a distributive investment. Water supplies generate many primary and secondary
benefits and are essential for, besides public health, urban and industrial development, which ultimately lead to an enlargement of the social product. As an investment that promotes efficiency and economic development, it is a productive investment. To be fruitful as a productive investment, however, it needs many other complementary inputs and factors. As the relationship between water supplies and increased output is rather indirect and the clearly perceived benefits are often in terms of public health and amenities, investments in water supplies are better regarded as distributive investments. Such a consideration will, however, have its own implications to the financing and rating policies.

It is now rightly recognised that public water supply programmes should form part of programmes for economic and social development and need an integrated, multi-sectoral approach.

Development programmes: The WHO and other international agencies have succeeded in creating an awareness of the problem among the member nations and effect transfers of knowledge and funds. But the responsibility of providing water supplies lies ultimately with the concerned Governments.

A review of the national and regional programmes of public water supplies in India leads to the inescapable conclusion that much is said but little has been accomplished, finance
being not the only constraint. For instance, even when the Centre offered financial assistance, the State Governments were in an unprepared state to handle the programmes. There were multiple agencies, but without coordination and any long range plans. A comprehensive programme, a determined effort to implement the programme without succumbing to local and political pressures and arrangements for the proper maintenance of the facilities created will help the provision of water supplies more than the creation of agencies or its inclusion in the minimum needs programme, twenty-point programmes, etc.

Technology: Among the constraints to the development of water supplies cited often are the lack of trained personnel, lack of materials, etc. All such problems are only outward manifestations of the basic problem of the type of technology used. The current highly sophisticated technology available in the developed countries requires an infrastructure of repair services and skilled manpower, and may be beyond the capacities of the developing countries in terms of both costs and skills. A direct transplantation of such a technology may ultimately lead to a total failure of the system due to lack of spares and repairs in time in the developing countries. The technology, if it should be borrowed at all, should be adapted to the local conditions particularly from the point of view of maintenance. No public water supply programme for rural areas and smaller towns can succeed unless
The current technology dictates a minimum size for a water supply plant, which is often quite large. A large project, besides requiring huge investments, may involve several uncertainties and delays, and an excessive preoccupation with a large project may lead to a failure to realise the humbler but quicker alternatives to increase the supplies, as the history of Bangalore water supplies shows.

**Project selection:** The history of Bangalore water supplies also reveals certain shortcomings in project selection and project design which should be avoided. We must first note that any designing in the absence of adequate data will be inefficient as the natural tendency of the planners would be to go in forever design' rather than 'under design' as a measure of caution and would lead to an avoidable waste of resources. This was obvious in the design of remodelling of distribution network. A proper sequence of steps in project formulation beginning with data

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collection must be observed, and it must be remembered that the availability of adequate and reliable data reflects sound management.

Secondly, the selection of a project must be based on an economic evaluation of the alternatives, but the practice in the case of Bangalore water supplies seems to be to select the project with the least financial costs, even when the cost differences between the alternatives are not really significant. This was true in the case of both the projects and the components of a project. A closer examination of the alternatives is needed because a slight change in any of

1. It is true we have to begin somewhere and cannot go on collecting data. As Arthur Mass says "If a designer were to ask a hydrologist if the streamflow data on River x were adequate for design and improvement of the river, the latter would probably respond that he needed ten more years of observations to be able to interpret certain inconsistencies in the statistical analysis of the record. If after ten years the designer were to return to his colleague and put the same question, he would probably get the same answer." Basically it is a question of reconciling the "conflicting interests of the data expert and those of the system-designer and dam builder", any overweighting of the former will usually result in too little development and any overweighting of the latter in inefficient development, "What is needed is a definition of the optimal balance between the two, and some institutional means for enforcing it" (See Arthur Mass, et al., op.cit., p. 585),
the elements like the rate of interest or unit costs of power, may affect the total costs and present an entirely different picture. The tendency to append an 'economic' analysis in terms of financial costs after the engineering analysis is completed must be avoided. It is here that economics should play a more useful role.

Thirdly, as all the projects must be ultimately approved by the Government, the water supply undertaking may cite various grounds in an effort to convince the Government about the superiority of the project on hand, and contradict them while proposing another project. All this may be done by the same agency and at the same point of time, as can be seen in the project reports of the Arkavathy Fourth Line and the Cauvery Second Stage projects. This type of 'salesman' approach to project selection must be replaced by an objective evaluation of the alternatives and a comprehensive long term planning with projects lined up in sequence for the future.

Institutional framework: The tendency of the water industry to integrate vertically is borne out well in the case of Bangalore water supplies, with all the related processes centralised in a single agency, viz., the BWSSB. Prior to the formation of the Water Board, production of water supplies was under the control of the PWD, while the distribution of water supplies was under the control of the
City Corporation and, although there was no concrete evidence, the water supply problems were ascribed to such a dual control.

But it was essentially at the instance of the World Bank during the negotiations for aid that the Water Board was established. The logic of the World Bank's insistence on the creation of a new and separate agency even before the negotiations are finalised — actually even commenced — is not clear, unless of course it is seen as a part of standardised recommendations of the international agencies.

We may draw briefly a few inferences on the imported institutional framework for water supplies.

a) The institutional change did not bring about any improvement in the position of water supplies, and in fact, it was to the contrary, with no improvement works undertaken in the first seven years of the Water Board's existence.

b) It also generated many new inter-organisational problems such as, for instance, the controversies over the public hydrants, free allowance of water, water supply to 'villages' absorbed within the Corporation area and so on.

c) The major impact, however, was on project selection and construction. Prior to the formation of the Water Board, the procedure generally was to appoint a committee of experts to make a detailed study, on whose recommendations the Government would take the final decision and would entrust the project
selected to the PWD for further designing and construction. There was a clear separation of functions of evaluation, planning and construction. Under the present arrangement, the Water Board submits a proposal to the Government for sanction and after approval by the Government, detailed designs are prepared, funds appropriated and the project is executed. We have seen how this need to convince the Government may induce the Water Board to 'sell' the project to the Government at the cost of inconsistency in its own justifications.

d) There has also been a change in the method of execution of projects, which is, of course, not specific to the Water Board. Earlier, under the PWD, the works were generally executed as departmental works, while under the Water Board they are got executed as contract schemes. While we cannot make any cost comparisons, it is reasonable to assume that contractor executed schemes are more expensive than department executed schemes.

e) Above all is the issue of the extent of public accountability. The Annual Financial Statements of the Water Board — its budgets — are placed before the House of Legislature open for discussion, but not subject to vote, and the Government may decline to interfere with the autonomy of the Water Board even in the face of public demand. This is not to be construed as an argument for increased governmental interference and control, but only to stress the need for adequate measures to ensure an efficient functioning of a public utility with monopoly powers providing a basic necessity, and performing what is essentially a civic function.
It follows that the creation of a new agency has contributed neither to efficiency nor to economy.

Production of water supplies: We find that the time taken to construct a water supply project in the Bangalore water supply system is about three to four years. For instance, the Dasarahatta plant was commenced in 1963 and completed in 1966; the CRS project was commenced in 1929–30 and was commissioned in 1933; and, if we exclude the delay due to initial uncertainties and controversies, major part of the 30 MGD Canvey project was constructed between 1971–74.

There seems to be no need to import any technology as all the projects were designed and executed with only local skills.

Bangalore water supply system, like many other metropolitan systems in India, is a single purpose, multi-unit system, which is disadvantageous from the operational and cost points of view. But as experience has shown, it has also been an advantage in terms of stability of total supplies, one unit compensating the failure of another unit.

We also find that throughout the period, water supplies have not been able to keep pace with the growing demand and per capita supplies showed a tendency to decline, with any increase being only short-lived. In such a context, continuous and long-term planning for water supplies is imperative.
It is generally held that water supply projects have initially large unutilized capacities; that measures should be taken to stimulate demand; and that capacity output is reached only after a lapse of time as demand increases. But in the case of Bangalore water supplies, even though the size of successive increments in capacity has been increasing over time — the successive increments in capacity since the Forties have been in the ranges of 4-9 MLD, 20-45 MLD, 130 MLD — the time taken to reach the capacity output has been declining from about eight years in the Forties to about one or two years in the Seventies. At present, the constraints to reach capacity output are technological and on the supply side, but not on the side of demand.

We may distinguish between two types of constraints to increasing the supplies — those associated with the treatment and transmission capacities and those associated with the storage capacity proper. Improvements designed to remove the former yield returns almost immediately, while the improvements designed to remove the latter have a longer gestation period. While the two are inter-related and one is meaningless without the other, the elementary rule that the scope for the former should always be closely examined first should not be forgotten, as was done in the case of Bangalore water supplies between 1964-71.
Levels and structure of consumption: The per capita consumption of about 130 lpcd in Bangalore is less than the national minimum of about 180 lpcd prescribed for Indian cities and almost insignificant in comparison with that in the cities elsewhere. Consumption levels within the city differed with access to water supplies, per capita consumption among those with individual connections being more than three times that among those depending upon public hydrants. The ultimate goal should be to serve all the consumers through individual connections, not only for its revenue implications, but also to derive the health benefits associated with the public water supplies. But there seem to be several physical, financial and technical constraints to the realisation of such a goal in the near future.

It is surprising, if not incredible, that the total number of connections should only be about a third of the total number of dwelling units in a metropolitan city with public water supplies for nearly eight decades. This area needs more detailed investigation.

It appears, therefore, that public hydrants are going to remain necessary, and there should be a definite policy regarding their location and numbers.

Total consumption was composed of consumption through domestic connections, non-domestic connections and public hydrants, and unaccounted for water. The increasing share of non-domestic consumption in the total consumption is an indicator of growing industrial activity in the city and is also beneficial to the Water Board from the revenue point of view. However, in the context of rigid and inadequate supplies, priorities have to be determined, and naturally they should be in favour of domestic consumption.

But industry needs water, and more water attracts more industries. There may arise a situation when the industrial units will have to declare a holiday due to lack of water, as the Bharath Electronics Limited and the Indian Telephone Industries did in March 1979. To avert such crises, we may only reiterate the recommendation made in the GEB for Bangalore in 1972 that "until at least water supply and housing situation in Bangalore improves to a tangible extent, all new schemes for the establishment of such industries should be diverted to other centres such as Hub, Mysore, Belgaum, (etc.)".

A certain amount of loss is inevitable in any distribution system, but unaccounted for water ranging between 15% - 34% of total supplies may largely be due to the technological inefficiency, defective institutional arrangements and administrative laxity. The estimated value of the lost water is about

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Rs. 180.00 lakhs per year and, even under the present arrangements, there is sufficient scope to reduce the extent of unaccounted for water through more efficient metering and billing of supplies.

**Financing of water supplies:** Theoretically a firm can rely on its own resources and internal as well as external borrowings, but all of these may not be available to a water supply undertaking. The approach adopted by the international financing agencies that a water supply project should "cover all operating and maintenance costs including debt requirements and produce a surplus which will help finance further extensions" may be neither acceptable in principle nor feasible in practice. It ignores the nature of water supply investments, and we may agree with the Estimates Committee which held that it would be undesirable in principle. The resultant rate structure will clash with the redistribution and welfare objectives of the State and may not be politically acceptable and feasible. In such a context, borrowing from the international agencies like the World Bank will also not be possible because they insist on a 'bankable' project recovering full costs and more, for further investments, and the attempts to secure such aid may prove futile as they did in the case of Bangalore water supplies.

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The only alternative available then is internal borrowings — borrowings from the Government, from the financial institutions and on the market through bonds.

The twelve year debentures of the Water Board carrying an interest of 4% per annum can hardly attract buyers on the open capital market where even other public sector units offer bonds of 13% — 15%, and it is indeed creditable that the Water Board could raise Rs.10 crores or 30% of its total capital receipts during the period, by the sale of such debentures.

Naturally, loans from the Government emerged as the major source of finance accounting for nearly 40% of the total capital receipts of the Water Board. The Government loans carried an interest of 6%-8% per annum and were repayable in twenty five equal annual instalments. To the extent the rate of interest charged on Government loans is less than the market rate, water supply has been subsidised. But as the assets of the water works have generally a long life, sometimes as much as fifty years, loans repayable over twenty five years cast a greater and an unjustified burden. This was pointed out as early as 1969 by the Estimates Committee, but neither the Water Board, nor the Government has pursued its recommendation earnestly.

The Life Insurance Corporation of India has in recent times been financing urban and rural water supply schemes. Its role and activities in this area may be investigated separately.
The LIC has lent Rs. 7 crores to the Water Board charging an interest of 7½-7¾% per annum. It could act with more grace by not stipulating such conditions as the introduction of its Salary Saving Scheme in the Water Board etc., while lending to a water supply undertaking.

**Revenues:** As is to be expected, water revenue was the most important source of revenue, accounting for more than 83% of the total revenues in all the years. From the available data, it appears that non-domestic consumers and the City Corporation are going to be the major sources of revenue in future.

Revenue collected during the five year period 1971-76 increased from 74.64% to 88.16% of the total demand charges, with collections from the domestic consumers being the poorest. The opinion of the Water Board that it is easier to collect the charges from the City Corporation, and hence better to provide free allowance of water, is neither correct nor conducive to economy and efficiency. The Water Board's lenient attitude towards domestic consumers and near-exclusive concentration on collections from non-domestic consumers are also not sound practices. There is a need to investigate this area more closely and evolve more economical and efficient revenue collection procedures. This branch is certainly over-staffed as can be seen from the ratio generally maintained — one clerk to be in charge of 400 connections, one meter reader and one
assistant to read about 800 connections a month and so on.

**Expenditure pattern:** We cannot really draw any generalisations about the levels and composition of expenditures of the water supply undertakings. Total annual expenditure fluctuated, rising sharply in the years in which a major construction programme was undertaken. Nearly seventy percent of the total expenditure was capital expenditure, and works in progress and interest were the major elements of capital expenditure.

The relative shares of revenue and capital expenditures fluctuated over the years depending upon the activities of the Water Board. While revenue expenditure showed a tendency to increase steadily, capital expenditure occurred in spurts.

There were certain expenditures associated with capacity creation and certain expenditures associated with the production of output, the former constituting nearly sixty percent of the total expenditure during the period. Of such expenditures on capacity creation, nearly two thirds was on the construction of the distribution network. Treatment and production of water supplies accounted for more than half of the operational expenditure.

Though there were several preliminary expenditures in the earlier years, as much as two thirds of the expenditure on capacity creation was incurred over a period of three to
four years. Further, although no major capital works are undertaken, there will be certain capital expenditures to be incurred and accounting exigencies may claim a part of them as revenue expenditure.

Waterways and pipe lines, reservoirs and dams, drains and pipe lines, power charges and chemicals were the main items of expenditure under different heads.

**Costs of water supplies:** We may distinguish between various kinds of costs of water supply: economic and financial costs; capacity, customer and commodity costs; production, transmission and distribution costs; fixed and variable costs; average and marginal costs, etc.

It is generally held that fixed costs constitute a high proportion of total costs and the cost structure of water supplies is different from that of others. This is true only in a static context. For the period as a whole, the cost structure that emerged was: fixed costs - 50.18%; production and transmission costs - 26.61%; and distribution costs - 14.21%. But the structure of costs changed over time and the share of fixed costs tended to decline as production reached the full capacity levels. Then viewed in a dynamic setting, the share of fixed costs may be neither high nor constant. The structure of costs must be seen as related to the levels of output — whether it is near or far from the capacity output.
Even among the so-called variable costs, there were certain 'indivisibles' like wages, maintenance, etc., which were not actually related to output, and such costs constituted about 10% of total costs. This explains why total operations and maintenance expenditure does not fall in the years in which output falls. The actual variable costs amounted to about 83% of total costs.

While the operational costs tended to increase steadily, the fixed costs tended to rise sharply on creation of additional capacity, as for instance, from Rs. 30.76 lakhs to Rs. 523.72 lakhs after the commissioning of the Cauvery project.

The average cost began to increase even before the capacity output was reached because, while there was no significant fall in the average fixed cost over the range of output 45900 M.Y and 53800 M.Y, the average variable cost tended to increase, though slowly, as output increased. The average cost registered a steep rise from 0-27 paise to 0-80 paise per 1000 litres as soon as the new project was commissioned.

The LRAC of Bangalore water supplies is also expected to be increasing.

Interest on loans and power charges were the more important items under different heads.

**Pricing of water supplies**: Any price has to discharge economic, financial and social functions, and the various functions dictate different pricing policies.
There has been a long debate over the application of marginal cost pricing to public utilities in order to secure an efficient allocation of resources and yet the theory is in an unsatisfactory state. It is generally suggested that we may first derive the ideal tariff structure based on marginal costs and then introduce the deviations necessary to satisfy the financial and social considerations. Any tariff structure devised should be simple to understand and to implement, and must also be "politically acceptable". But translating this theory into practice presents several problems and the calculation of marginal costs is a hazardous task because of data limitations, uncertainties, etc.

Coming to the practice of pricing of Bangalore water supplies, we find that the Water Board is expected to function on a no profit no loss basis, and has adopted broadly an 'average-cost pricing' policy. But the Water Board has included in its fixed costs, besides interest and depreciation, annual loan repayments. By including amortization in addition to depreciation and interest, the Water Board is charging more than the average cost and actually creating funds for future investments also in a sense. This is strictly a traditional, backward-looking accounting approach trying to recover sunk costs also, generating total revenues equal to total costs, while economic efficiency demands the application of forward looking marginal cost pricing.
The Water Board has introduced an element of price discrimination also in favour of domestic consumption and lower levels of consumption. Its approach was to derive that level of rates for non-domestic consumption which would meet the short-falls in total revenue equal to total costs, given the rates for domestic consumption, while the general recommendation is to set prices equal to long run marginal costs for non-domestic consumption.

The policy of free allowance of water lost its relevance with the change in the institutional framework and may be discontinued with appropriate changes in the property taxation by the City Corporation. As the City Corporation is divested of its function of water supplies, it is logical that it should be denied the corresponding source of revenue as well. The present practice has only been a source of endless controversy and has not contributed either to efficiency or to economy.

The rate applied at present to consumption through public hydrants is the rate applicable to the highest slab of domestic consumption. It reveals a mechanical approach and a lack of realisation of the very nature of public hydrants and the purpose of progressive rates. No doubt consumption through public hydrants falls in the highest slab of 1,00,000 litres and above per month, and it must, because of its nature. It is but fair that the rates applicable to consumption through public hydrants be modified suitably.
Generally for water supplies, price fluctuations are held to be necessary to induce consumption initially when unutilised capacity exists and to restrict consumption when capacity output is reached. But some object seriously to such fluctuations while some others dismiss such objections as simply a matter of prejudice. A reduction in price is welcomed by all but what happens when water rates are raised, is best illustrated in the case of Bangalore water supplies—a public agitation in the city, criticisms of the Government and the Water Board in the Press, long debates, sit-down strikes and walk-outs in the Legislature, etc., making any increase in water rates risky. No wonder water prices remain sticky.

At the current levels of prices and costs, the Water Board has been earning a net profit, albeit small, showing that a water supply undertaking need not necessarily be run at a loss. We cannot, however, miss the irony that a public utility providing for a basic need and expected to function on a no-profit-no-loss basis should be earning net profits, while many other public undertakings expected to be run on commercial lines should be incurring perpetual losses.

**Limitations of This Study:**

We may now state the obvious, viz., the limitations of this exercise, which are indeed many. We have examined only the broad areas of water supply without going into the specific
issues like the costs of treatment, etc. We have not attempted any demand projections or evaluation of projects. Nor have we been able to explain the intricacy variations. And so on.

Strictly speaking all such issues form subjects for separate studies and raise many questions that cannot be answered in an investigation of this sort. For instance, what are the economic costs of the reservoirs that take away valuable parks or scenic open spaces? Or for that matter, what about the costs of traffic diversion caused by the closure of major link roads for laying the trunk mains in the city for months? What are the levels of income, levels of education, etc., in various zones which influence water consumption? All such obviously require independent investigations.

Even in this limited exercise, there were several problems with regard to data: either data were not available at all (e.g., length of pipe lines by sizes); or were available as aggregates which could not be segregated (e.g., expenditure, consumption); or were available from different sources which contradicted each other (e.g., the numbers and capacities of reservoirs); etc. To these, if we add the limitations of skills and resources, it becomes clear why we did not attempt something more ambitious in this project.
As was stated at the beginning, this study was designed only as a preliminary and exploratory exercise. Its objects were limited — to collect and collate data available on Bangalore water supplies and present them in a meaningful form; to find the extent to which the tools of economics can be applied in the solution of the basic problem of inadequate water supplies which can degrade urban life; and to identify problems and areas for further study.

3.3. Topics for Further Study:

We may now state a few of the problems that have been suggested by this study to indicate the magnitude of the area and the extent to which economic analysis can play a useful role.

(a) There are several specific aspects of water supply which require an integration of economic analysis and engineering analysis such as:

1. costs of water treatment;
2. costs of transmission;
3. optimisation of the distribution network;
4. optimum size for reservoirs, etc.

(b) There are certain studies which are almost purely economic, such as:

1. total and unit costs of water supplies from different plants;
2. marginal costs of water supplies;
3. tariff policy and structure;
4. costs of metering, etc.
(e) There are certain aspects which require field investigations/surveys, such as:

1) determinants of demand;
2) elasticity of demand — scope is limited in view of the 'sticky' water prices;
3) industrial demand — very essential and should examine the purposes of use, quantities used, own supplies, recycling procedure if any and discharge of waste water;
4) public hydrants, etc.

(d) There are certain studies to which Economics can lay as much claim as Management Sciences, such as:

1) measures to check unaccounted for water;
2) criteria for delimiting the areas like mines;
3) rational practices for revenue collection;
4) inter-organisational relations, etc.

(e) There are certain areas where more exploratory attempts are required such as:

1) appraisal of projects;
2) measurement of benefits of water supplies, etc.

8.4. Conclusion:

The limitations mentioned earlier were not as an apology for water supplies present a variety of economic, social and technological problems, all of which cannot be considered in any single study. Water supply has many dimensions and requires the analytical tools of various social sciences — economics, political science, geography, etc. Even within
the framework of economic analysis, one may view it as a public utility, as an urban problem, as a part of regional planning, etc. But even as a public utility, water supplies, though meeting the most basic need, have only received scant attention unlike others such as electricity and transport. However, with the transformation of water from a free good into a scarce economic good, water supplies are likely to receive greater attention in future.

There is now a growing realisation that there is enough water for all only to use, but not to abuse as dumps for industrial and other wastes and that rational practices in the use and conservation of water are needed. To deal with these problems, one has to move from Economics of Clean Water to Economics of Waste Water.

Water is accepted as a saleable commodity in urban areas, which are also inhabited by the relatively affluent, and hence urban water supplies have so far received greater attention. The present "water famine" in the rural areas all over the world is more alarming than the possible global "water crisis" in future. Rural water supplies present a different variety of problems, and there is a great need to focus more attention on rural water supplies.

More research is of course no substitute for more water supplies, but it can help us to understand the problems and suggest possible solutions. It is for this reason that we
suggest that problems of water supplies should receive greater attention.

This was a very unambitious study of the economics of urban water supplies with special reference to Bangalore City. Like Bangalore water supplies, this study has been inadequate, and like Bangalore water supplies its analysis also cannot become adequate either in the first or in a single attempt.
### Table 8.1.1: Financial Aspects of the Alternative Schemes Considered by the AdHoc Committee in 1954

<table>
<thead>
<tr>
<th>Scheme</th>
<th>For 30 MGD supplies</th>
<th>For 60 MGD supplies</th>
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<tbody>
<tr>
<td></td>
<td>Capital cost</td>
<td>Cost per 1000 glms.</td>
</tr>
<tr>
<td></td>
<td>(in Rs. lakhs)</td>
<td>(in Rs.)</td>
</tr>
<tr>
<td>Arkavathy</td>
<td>810</td>
<td>0.84</td>
</tr>
<tr>
<td>Cauvery</td>
<td>1000</td>
<td>1.12</td>
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<tr>
<td>Hemavathy</td>
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<td>1.33</td>
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<tr>
<td>Shinsha</td>
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<td>1.12</td>
</tr>
</tbody>
</table>

**Source:** Govt. of Mysore: "Long Range Water Supply Scheme to Bangalore City - Report of the AdHoc Committee, op.cit., pp. 110-111.

### Table 8.1.2: Capital Costs of the Rising Main for Three Stage Pumping as worked out by the Water Board

<table>
<thead>
<tr>
<th>Size of the main (diameter in inches)</th>
<th>Total Capital Cost (in Rs. lakhs)</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td>42</td>
<td>1285.17</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>1290.00</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>1224.75</td>
<td>&quot;Economical dia.&quot;</td>
</tr>
<tr>
<td>51</td>
<td>1225.20</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>1225.40</td>
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</tr>
</tbody>
</table>

**Source:** WWSSE: "The Project Report", op.cit., p.36 (See also p. 38).