CHAPTER VI

6. SUMMARY OF FINDINGS AND CONCLUSION

In the foregoing chapters the objectives set out in the introductory part, have been realised both with the help of secondary and primary household survey as well. This chapter intends to make a thematic presentation of the actual outcomes that have forth come in the study. Thematically this study is fourfold. Firstly the macro picture at the nation as a whole, and the district profile arrived with the help of the secondary source of information, formed the basis of the subsequent exercises carried out in the study. Secondly, the actual behaviour of household, with respect to water for domestic uses as captured through household survey, represented the demand aspect of the question in the hand. Thirdly, the environmental implications of water provision from the points of view of ground water depletion, water quality, health and environmental conflicts, remained a crucial facet of the study. And finally, the institutional mechanism which operationaly the water provision is of great significance in this context.

6.1.1 Pattern of rural water provision in India and in the study district

The analysis of the NSSO data from 54th round unfolded the overall scenario of various schemes as sources in the country as a whole. Evidences support the view clearly the dominance of modern/mission schemes proving to be a major principal source of water over the period. Consequently, the traditional schemes had lost its significance as principal source in rural India. However, traditional schemes still remained as major supplementary sources of water for rural habitats. An hypothesis testing carried out in this study proved this argument.

On the quality front, even the modern schemes attracted a substantial number of complaints from the users particularly with the tube well and hand pumps. Contrary to the principal of modern schemes i.e., providing water on a continuous basis even during summer season. The NSSO data brought to light the plight of households who depend on modern schemes, suffering from water scarcity during summer season. A large-scale use of earthen containers was reported in states like
Haryana, Rajasthan and Gujarat. In states like Tamilnadu, Kerala and Assam and a widespread use of plastic containers was reported and among them Tamilnadu ranked first in plastic containers. The reason may be why the Tamilnadu state is seriously contemplating to introduce an Act banning the use of plastics in the state. However, the act is yet to be implemented and still waiting for the legislative approval. In the case of water quality treatment by the users, less than 5 percent reportedly adopted scientific methods, while 75 percent not doing any treatment and the rest of them took to some conventional modes like using plain cloth for filtering and so on.

In the process of preparing a profile of rural water supply in the district at the habitation level based on the re-survey (1999) information collected by the TWAD Board, the analysis of the data showed the modern sources provided include hand pumps and power pumps (OHT, public fountain, and House service connection). Ninety five per cent of the habitations have access to hand pump facility. Forty six per cent of the habitations have been covered with power pumps and 8.4 per cent has pipelines extended from other sources. Even though more 90 per cent of the habitations were covered by hand pump scheme, but the provision of hand pumps as against the Government norm has not been fulfilled in 73 per cent of the habitations. The concentration of OHT facility is higher in wet villages. The capacity of OHT has been lower as against the Government norm in all the habitations. In dry villages the number of stand posts provided per 1000 population is below the norm. Combined Water Supply Scheme (CWSS) is the latest water supply program under implementation. Of the total capital invested in the district, 56 per cent goes to CWSS. In terms of coverage of habitations, CWSS could cover even remote villages where water scarcity is acute, with potable water. However, CWSS is not cost-effective. Of the total schemes, about 51 per cent of them were installed during 1981-90, which is the International Drinking Water and Sanitation Decade. Regression results suggested that variations per capita water per day supplied have been explained by independent variables such as area, stand posts per 1000 population, and yielding capacity at 5 per cent level of significance. The R square has been 0.22.
The installation cost per scheme worked out to be Rs.0.29 lakh for hand pumps, Rs. 2.89 lakhs for power pumps and Rs. 1118.1 lakhs for CWSS at current prices. In sum, the cost of provision of public water has been significantly higher more so with CWSS. In financing the water supply schemes 49.3 per cent of the total cost was borne by LIC extended loan. The state contributed 16.6 per cent through MNP, 6.3 per cent by the local body and 5.9 per cent by the Central Government; others to the extent of 16 per cent towards various schemes in the district. The contributions made by international agencies have been less than one per cent of the total. With respect to cost, the provision of water supply is skewed more towards wet, and mixed villages than the other categories. Execution of water supply schemes were more by TWAD Board followed by local bodies, District Rural Development Agency (DRDA) and others.

The hard fact is that only less than 10 per cent of the houses had in-house latrine facilities. Despite this, 99 per cent of households used open-air defecation. This may not have direct link with rural water provision, but indicates the over all insufficiency of water for all purposes.

6.1.2 Household demand for water

The findings that emerged from the analysis of primary household survey are as follows dependence on modern/mission sources had started only after 1970s and remained as a major source at present. Wet village received more number of schemes than the other category of villages. Mixed villages enjoyed more of combined water supply schemes. Dry village received relatively less public utility facilities and depended largely on traditional sources. Hilly region has been served by traditional source through modern scheme of distribution of water. Major modern schemes identified in the study villages included hand pumps, power pumps (OHT, CWSS, GLWR), public fountain, house service connection, and agricultural bore-well while, the traditional sources are spring, kudavu, stream, river, pond and open well. Among the modern schemes, power pumps are dominant from which respondents drew water for domestic purposes. Hand pumps are more widely used in wet village. House service connections are not given in dry and hilly regions.
The mean distance traveled to fetch water in wet and mixed villages was less than 100 meters and time taken being 62 minutes. In dry and hilly regions the mean distance was 775 meters and spent on an average four hours towards fetching water for domestic purpose. The time spent for fetching and waiting time for traditional source ranged a minimum of one hour to a maximum of 6 hours during summer. The total water drawn for domestic purposes per household is estimated to be 366 liters. Of which, water utilized for drinking and cooking purposes is 30 liters per household and it constitutes 8 per cent of the total consumption only. The lpcd is 76 liters, and for drinking and cooking purposes it is 6.1 liters. The per capita consumption by livestock is estimated as 10 liters per day.

A causal relationship is established between per capita water consumption per household and independent variable such as area, cooking per day, and family size and value of house. These four variables turned out to be significant at 5 per cent level. The value of R square is 0.21. Area and family size showed negative relationship while, value of house and cooking per day showed positive sign. Willingness to pay is positive with 75 per cent of the respondents. On an average, the amount of money that they are willing to pay is Rs. 8 per month per house for improved water supply. Among the total respondents, the percentage of women water collectors constituted 93.8, inclusive of female school going children.

6.1.3 Environmental implications

- Water quality results confirmed 25 per cent of the total water samples tested showing values above the maximum permissible limits. Of which surface water samples contain higher faecal coliform levels while in ground water samples total hardness, iron, TDS, chloride, magnesium and calcium levels were found above the permissible levels. On health front, contrary to the responses of the respondents, the health officials confirmed higher percentage (above 60 per cent) of occurrence of water borne diseases in the sample villages. Typhoid being the highest, followed by jaundice and cholera were the water borne diseases prevailed in the villages. Ninety per cent of the total respondents owned no latrines. Even those who are all having, not preferring to use the latrines rather than going for open-air defecation. The decadal growth rate of depletion of groundwater showed that it was 6.4 meters during
1971-80, it had declined to 8.5 meters during 1981-90 and from 1991-99 the level showed 7.5 meters. Fall in groundwater will have adverse impact on rural water supply. Hypothesis testing with the help of Analysis of variance (ANOVA) confirmed that there is direct relationship between environmental degradation in terms of depletion of natural resource and the burden of women in general and female children in particular in collecting water.

Environmental conflicts in the district unfolded a new dimension. As against the general tendency that increasing number of bore-wells resulted in depletion of groundwater thereby affecting drinking water source, the newer phenomenon observed is that combined water supply scheme meant for augmenting drinking water provision allegedly depleting the groundwater potential thereby damaging the water meant for the agricultural activities.

6.1.4 Institutional mechanism

Two separate tariff rates for rural water supply based on the primary survey information have been worked out: a) a rate ranged between Rs. 22 and 44, as per capita per annum for recovering replacement cost and O & M cost for the all the study villages, and b) a rate Rs. 48 per household per month for recovering O & M cost and maintaining quality for those having house service connections.

6.2 Suggestions for Policy Improvements

Policy prescription towards rural water provision is yet to gain momentum. The National Water Policy of 1987 has not emphasised adequately to drinking water provision. But the need of the hour is to ensure potable water supply to all. This has been the agenda right from the center on the top to local village panchayats to the bottom. Increasing realization of water borne diseases due to consumption of unsafe water, makes it all the more necessary to prioritize drinking water and accord utmost importance to drinking water provision.

No doubt, efforts have been made at the central and state levels from time to time to cover all the habitations with adequate water provision. The Rajiv Gandhi
Drinking water mission stood as a testimony to this. But any effort made in a piece meal fashion may not fetch the desired results. A holistic approach to policy making is mandatory at this level. It means policy exercise may consider efficiency, equity and sustainability and give equal weightage to all the three components. In this way the target group gets assure of not only the quantum prescribed but also the quality being ensured. The present study made in this backdrop makes the following suggestions towards improving the present policy and strategies.

1. Comprehensive Water Supply Schemes (CWSS), which is in vogue in the study district needs certain modifications. The present system of CWSS poses a host of problems. For instance, in the event of a failure of CWSS in one particular location, the impact will be on all the users from various different locations, which are connected under CWSS. Similar is the case of water quality. Therefore, the present CWSS system should be allowed to function not in isolation of the existing systems, be it a traditional or a modern.

2. The norms, set out by the state Government, the TWAD board, are the offshoot of the Gandhi Drinking Water Mission. As estimated in the present study, water required for drinking and cooking purposes alone ranged from 5 to 8 liters per capita per day lpcd. The current norm viz., 40 lpcd followed may be inappropriate as the actual quantity requirement for all domestic purposes was more than 75 lpcd.

3. The use of potable water is not warranted for certain domestic purposes such as house cleaning, gardening and other uses. However, the actual practice is to use the potable water for all the purposes. The feasible solution lies in protecting and maintaining the traditional schemes thereby encourage households to resort to traditional schemes for purposes other than drinking, cooking and bathing.

4. On confirming the fact through field survey, the deplorable conditions of traditional schemes, particularly the operation and maintenance part in all the selected villages, it is suggested that it is imperative to invoke all the traditional practices like irrigation tanks, percolation ponds, by means of watershed management and water harvesting. This is a solution for sustainable water use and practice in the long run.
5. In India, the access to safe water is declared as a fundamental right. This necessitates and reaffirms the state’s responsibility in ensuring this. The policy suggestion here is a need for a change in the mindset of the users, who should come forward to participate in the programme and to share the expenses involved collectively.

6. It is observed that there is a disparity in the provision of schemes across villages. Wet villages enjoyed more water supply schemes than the dry and hilly regions. The state provision shall be holistic and balanced if more schemes are diverted towards dry and hilly regions. Even the NGOs have a greater role to play in dry and hilly regions, where there is a dearth of schemes and sources.

7. Hand pumps and stand posts are basically mechanical appliances, requires proper maintenance to avoid breakdown. These appliances are subjected to all sorts of handling by all sections of rural people, and hence they are bound to breakdown. Consequently, the users are forced to resort to unsafe sources. The only solution to this is to operate efficiently and ensure proper and regular maintenance. Lack of operation and maintenance cost has been the major cause of failure of most of the state created schemes and sources. Inadequate finance is the offshoot of operation and maintenance problem. Improper tariff system is the reason for paucity of funds besides dismal budgetary allocation. To ensure the schemes to be sustainable in long-term necessary, funds need to be generated. The user pay principle may sound relevant in this context. The users shall be able to pay for maintenance. This calls for rationalizing the water tariff. Estimates made by the present study suggests that Rs. 48 can be fixed as a monthly tariff rate per household with house service connection instead of the present tariff of Rs. 30. The revised tariff can take care of quality of water plus operation and maintenance cost. Other users without house service connection may be charged between Rs. 22 and Rs. 44 per capita per annum. This rate ensures recovery of capital, operation and maintenance and quality of water. The tariff may be incorporated with the property tax as is practiced in most urban areas.

8. There is no gain saying the fact that water sources meant for drinking purpose are contaminated and causing health hazards. Human and mechanical failures are the major causes for the prevalence of water borne diseases. Mixing of sewage with
drinking water owing to leakage of water pipes is the dominant cause for the incidence of gastro-enteritis, which affected all the study villages. Special attention needs to be paid towards the safety of pipelines and this single measure may have a tremendous effect ensuring health care in the rural areas.

9. Controversies over traditional vis-à-vis modern sources are continuing over the last two decades. Modern schemes _ipso facto_ mission sources have an edge over traditional sources in the recent period. However, traditional sources are handy wherever modern source fail. Even in some cases, modern technology is applied to distribute water by drawing water from traditional sources. The traditional sources are to be conserved and preserved. The current concept of ‘rainwater harvesting’ needs to be popularized in rural areas. Modern schemes should supplement traditional water sources but not supplant the latter.

10. Supply based strategy of rural water supply has proved unsuccessful in the past. Still 44 per cent of the habitations remained partially covered with respect to provision in the district. Demand driven approach is the need of the hour. Investment decisions on water supply should be demand responsive.

11. There is a need for an enactment of an act on safe drinking water. As of now, there is no separate act towards achieving safe water in India. In view of the fact that more than 80 per cent of the diseases are water-borne, a full-fledged act may bring in double dividend in achieving safe water quality on the one hand and health care on the other.

6.3 Conclusions

Water as a renewable natural resource, which incidentally has no substitute, gets allocated across sectors like agriculture, industry and domestic use. Although the domestic sector requires less than 10 per cent of the total in developing countries, one fourth of the rural population is deprived of access to potable water. Even where provided, the distribution and water quality problems continue to persist. Water being the state subject, concerted efforts have been undertaken at the central and state levels since early seventies. India, as signatory to the United Nations
resolution on International Drinking Water Supply and Sanitation Decade 1981-90 had pledged its full support to the action plan under the Decadal programme. The launching of the 'Rajiv Gandhi National Drinking Water Mission-1986" for rural water supply is a break-through and brought in many changes in the implementation of water supply schemes in rural areas. In this backdrop, the present study made an attempt to understand the implications of rural water supply programmes at Tiruchirappalli district of Tamil Nadu. This is achieved by conducting case studies of five villages under four categories with a sample of 311 households to enable to discern the actual problems at the grass root level and to suggest measures for improving the existing system.

At the national level, the recovery of working expenses towards rural water supply has been zero as evidenced by gross receipts in states like Tamil Nadu, Karnataka, Madhya Pradesh and Tripura. This necessitates the rationalization of tariff rates for rural water supply in India. The rural water supply scenario in Tamil Nadu is no different from other states in terms of coverage of habitations. However, the state had the reputation of having started the Tamil Nadu Water and Drainage Board first in the country in the early seventies. The state budgetary allocation towards water supply has been gradually increasing from 41 per cent in 1992-93 to 71 per cent in 1997-98. While, the central assistance through ARP declined slowly from 36 to 22.6 per cent between 1990-1991 and 1999-2000.

Tiruchirappalli, the study district is situated at the central part of Tamil Nadu, where the rivers Cauvery and Coleroon flow through. The water supply schemes implemented in the district are of twofold, hand pump and power pump. The schemes depended entirely on groundwater resources. While a newer project called Combined Water Supply Scheme (CWSS) has been a recent phenomenon in the district in the last one decade. The CWSS depends only on sub-surface water through infiltration well and gallery.

The wet villages of the district enjoyed a higher number of schemes, fulfilling the Government norms of hand pumps and stand posts; here the NGOs played a greater role when compared to other category of villages in the district. The dry and
hilly villages received scant attention from the TWAD Board, as 90 per cent of the villages under this category did not fulfill the Government norm.

Historically, traditional surface sources of water had remained a major source for rural population for domestic purposes including drinking and cooking. After the advent of modern schemes people slowly started drawing from mission sources, which depended on ground water. Now, the advanced schemes like CWSS draw water from sub-surface water sources to cater to the needs of the area where there is dearth of water resource. The point to reckon with is switchover from groundwater to sub-surface sources as the former is depleting rapidly and the slowing down of yielding capacity. So far, between 1972 and 1999, the state had invested Rs. 1.8 billion towards this sector. The total investment made showed a declining trend moving from mixed to wet, dry and hilly region.

In financing the schemes, LIC loan was the maximum followed by MNP and local bodies. During the period of Rajiv Gandhi Drinking Water Mission, the maximum number of schemes was initiated. The TWAD Board has provided the highest number of major schemes, power pumps and CWSS in particular. The CWSS being a unique project of rural water supply in the district has already covered 36 per cent of the total habitations and the state is pinning its hope on this scheme to cover the remaining problem villages in the district.

Primary households survey results unfolded many interesting features on economic and environmental dimensions of rural of rural water supply. In wet and mixed villages the modern schemes dominated the traditional source, while in dry and hilly region the traditional sources served as principal sources and modern schemes are only supplementary sources as far as drinking and cooking purposes are concerned. By looking into usage of water for all domestic purposes, TWAD board and local body sources contributed more than 60 per cent, while the rest goes to traditional plus own sources.

On an average, the selected households consumed 76 lpcd; of which, the TWAD-Board provided 61 percent and the remaining is met through traditional sources. Drinking water consumption constituted 3 per cent of the lpcd. Distance
and time are the minimum in villages where the modern sources are predominant. Longer distance and time are associated where traditional source of water is availed. The legacy of women as water collectors has not changed; women continue to bear the burden of fetching water for domestic use in rural areas of the district.

Water quality results confirmed the presence of faecal coliform level over and above the permissible level in surface water, while the physical and chemicals parameters exceeded the tolerance limits in groundwater sources. Health hazards owing to contaminate water though is prevalent, majority of the households are unaware of the linkage between unsafe water and water borne diseases. Notwithstanding the Governmental efforts towards construction of latrines in housing colonies, as high as 90 percent of the households continue to use open air for defecation. Less than 10 per cent of the houses had any one form of the latrines. Even those owning seldom use the same for the purpose intended. Open-air defecation continues to be the practice in the rural district.

Community participation is limited to the extent of bearing minimum expenses of maintenance of machines and labour service to expedite the scheme executions.

Two sets of regression results confirmed a causal relationship firstly at the habitation level between water availability (lpcd) and area, stand post per thousand population and quantity liter per minute and secondly, between water consumption per household and area, cooking per day, value of house and family size.

Environmental dimensions of rural water supply brought forth by the study revealed depletion of groundwater natural resource to the extent of 1.1 meter, during 1971 to 1999. The spin-offs of environmental degradation in terms of depletion of groundwater resources on females including female children are evident in Oothukuli village. And finally the environmental conflicts arising over depletion of groundwater between agriculturists and domestic sector owing to the implementation of CWSS, add a newer dimension to water conflicts.

As part of an outlining alternative strategy, estimation of tariff rates for rural water users with and without house service connections were done separately.
Inculcation of user pay principle will help achieve sustainable use of existing schemes.

To conclude, the status of provision of drinking water at the national, state and district levels have been unsatisfactory. Despite efforts from National and International Forums, on an average sixteen per cent of the rural habitations remained uncovered. Even where provided, the problem of O & M continued to persist. This study confirms that the implementation of water provision schemes is skewed towards wet and mixed villages, while arid and hilly regions have received less attention. This is evident with respect to creation of physical assets such as hand pumps and OHTs, capital investment made, Ipcd, distance traveled and so on. Traditional sources of water continued to be handy in villages where the Government schemes played a lesser role. In regard to water quality, surface water sources were susceptible to biological contaminants, while the groundwater being affected by chemical and physical contaminants. As against the contention of the state, that modern sources are safer and the conventional sources are unsafe, the findings of our study are not in line with the Government’s stand on quality of water.

The policy implications that have been forthcoming pleaded for ‘demand responsive’ decision making in the provision of rural water supply rather than supply oriented. The latter proved to be a failure owing to uneven distribution across the categories of villages in the study district. More investment is needed in dry and hilly regions of the district where the existing schemes are small in number, while the demand for domestic use is higher in these two categories of villages. Finally the user pay principle needs to be invoked for rural water supply too. As against the arbitrary water tariff, a rate, which ensures continuous operation and maintenance plus good quality, has to be tried to achieve sustainability in rural water supply.