CHAPTER VII

SUMMARY AND CONCLUSION

The study has attempted to understand the pattern of water use, availability, adequacy, water quality, scarcity and stress in the Guwahati Metropolitan Corporation area. The pressures from the growing population, change in land use, expansion of urban amenities, and present status of water supply system, water storage facility, untapped surface water, declining ground water level and over dependence on the ground water resources have adversely affected the hydrological cycle and created scarcity condition in regard to drinking water availability and supply in the study area.

The primary objective of the study centers round the following problems:

• What are the dominant patterns of drinking water availability, supply and use in the city and the geoenvironmental and socio-economic determinants that lie behind them?

• How far the geophysical setting of the area and existing nature of urbanization and infrastructure development can provide the vital water resources to the rapidly growing city population?

• What are the means of safe water supply to the growing population?

• Whether the existing means of availability of water is adequate and sustainable in the long run?

• What are the effective strategies for compensating the deficiencies of hygienic water supply at present and during the days to come?

In order to assess and evaluate the water supply situation, both qualitative and quantitative methods are used. For this, a large volume of primary as well as secondary data have been collected. The primary data source comprises an elaborate household
survey conducted in each ward of the city, through a well-planned questionnaire addressing the issues of availability of drinking water and its pattern of use together with associated socio-economic and environmental parameters. The study examines the structural functions and effectiveness of the organized, unorganized and private water supply systems in the city. Applying GIS and remote sensing techniques, attempts have been made to delineate the potential ground as well as surface water sources, and examine the nature of urbanizations and pattern of infrastructure development in the city.

The huge database created based on the household survey using questionnaires has been processed and analysed on the computer with the help of data management softwares and the GIS.

In seeking answer to the entire gamut of issues being addressed in the study, the work is divided into six chapters. The first chapter presents a general introduction to the theme of present research providing a review of available literature, reports and monographs together with a historical perspective on the drinking water supply scenario in Guwahati city.

In the second chapter, the objectives identified for the study are formulated and the methodology to be adopted for achieving these objectives are discussed. Both the primary and secondary data sources are identified. An elaborate household survey based on questionnaires have been designed. Besides, computer-based data management system and GIS techniques have been used for data processing, analysis and integration. Satellite remote sensing data are also used for deriving spatial information and their interpretation under GIS environment.

The third chapter describes the geoenvironmental, socio-economic and environmental frameworks of the study area that have bearing on different aspects of
water availability, supply and use in the city and the potentials as well as constraints for development of drinking water system.

The fourth chapter describes the present scenario of drinking water in the city in the context of availability, status of water adequacy and water quality. Water, the life sustaining system, is directly or indirectly related to human health and well being. With the rapid growth of the city, though a relatively smaller segment of the population obtain regulated safe drinking water, a large proportion still face the problem of lack of access to safe and adequate water. It was found that 60% of the surveyed households in the city have, to some extent, the required amount of water for domestic uses, while about 40% of the households face inadequacy at different levels. Out of the 40% deficient-water households, 20% faces inadequacy due to drying up of sources during the winter months, about 13.2% faces erratic supply, 3.1% do not have access to supply water and 3.7% have water of undrinkable quality. In terms of water adequacy, it was found that only 9 wards have water adequacy, 34 wards are identified as inadequate and 17 wards fall under the category of highly inadequate. The large-scale withdrawal of ground water to meet the increasing demands of the exploding city population has already resulted in scarcity of drinking water in several parts of the city during the lean season.

The fourth chapter also deals with quality of the piped water. It is found from microbiological analysis that the piped water is largely contaminated with faecal coliform. The study focuses on the variation of drinking water availability in different wards of the city in terms of their physical and chemical quality. As regards concentration of heavy metals in drinking water, the study reveals that copper concentration is high in some places during summer. Lead concentration is also found beyond permissible limit in the city. Zinc concentration is high in the summer season.
Similarly, cadmium and selenium concentrations are observed to be high. There is no chromium content in the drinking water in the city. Due to excessive withdrawal of ground water which constitutes the dominant source of drinking water in a large part of the city, occurrence of high fluoride concentration resulting in incidence of fluorsis has been observed in certain parts of the city located mostly in frinze areas.

The fifth chapter describes mainly the pattern of use of drinking water in different wards of the city. The availability of drinking water from different sources is assessed and the pattern of use is discussed based on the surveyed data on households at ward level. This survey has revealed that 58 percent of the population depend on ground water or, in other words, they obtain their drinking water from wells, tube wells, deep tubewells etc. The position of piped water supply is miserably inadequate. It is surprising to note that the municipality and other statutory water supply agencies at the present juncture can not meet the need of piped water for a large section of urban citizens. This is primarily due to the absence of proper planning and coordination on the part of the supply agencies concerned and gross apathy and negligence of the government. Under the provision of the municipality law, supply of safe drinking water is a statutory responsibility of the municipality. Unfortunately, both the concerned organisations and the government have failed miserably in these aspects. In this chapter adequate emphasis has been given on these aspects whereby inadequacy of urban water supply and pattern of scarcity has been highlighted. It is observed that both financial and maintenance aspects receive scant attention from the agencies and the government. It is also noted that availability of useable water is directly related to the physical layout of the ground, intensity as well as distribution of rainfall in and around the city, and increasing demand of ever growing number of users. Another important aspect which is generally overlooked by the management is that slowly and steadily the available
recharge and catchment areas of water sources have been depleted and degraded. This is one of the major impacts of the lack or deficiency in ground water conservation in most parts of the city area. The pattern of various uses of water at household level has been assessed and attempts made to relate it to the selected socio-economic and environmental determinants. The results obtained through household survey indicate that the pattern of use of water is determined directly by the socio-economic background of the users and, to some extent, by the geoenvironmental setting of the locality.

The sixth chapter deals with the issues of drinking water sustainability and supply in the city emphasizing the need for proper utilization of the perennially abundant source provided by the Brahmaputra river that flows along the northern margin of the city, and the topographic advantage of the area with scattered hillocks that provide suitable locations for siting several large-size water supply reservoirs to serve different parts of the urban area. Besides the modern, centralized type of large scale water management system based on the Brahmaputra, the study also suggests judicious use of time-tested, decentralized systems based on water harvesting and conservation through groundwater recharge, injection wells, percolation tanks and (beels), watershed management etc.

The unprecedented growth of population in and around Guwahati city shall continue to create water scarcity in near future. Therefore, a perspective planning for water supply, primarily from surface water, needs immediate attention. Moreover, in accordance with the potentiality of ground water in different parts the GMC area, the planners should design the future water supply systems for public distribution as well as those at household levels.
It is suggested that the various snags affecting the drinking water availability and use in Guwahati, such as, techno-economic constraints, infrastructural inadequacies, lack of proper regulatory system, absence of coordination among different water supply agencies and the government, non existence of suitable system for regular monitoring and maintenance, and non introduction of modern sophisticated technologies for development and management of water resources etc. should be removed through a well-thought-out, integrated perspective plan. Creation of a reliable, uptodate and comprehensive information system based on appropriate conceptual and methodological frameworks appears to be a matter of paramount importance given the present state of our knowledge and understanding of the current drinking water scenario in this emerging metropolis that fails to cater to the need of its growing population.

It is expected that the findings of this study will benefit the planners and decision makers in designing an efficient water supply system and formulating appropriate policies for supply and distribution of drinking water in the city on a sustainable basis.