CHAPTER – 2

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2.1 General

Safe drinking water and clean and sanitary environment have been foremost on the agenda for developing nations for the past several decades. Numerous seminars, workshops, national and international conventions have been held, emphasizing the need and requirements and projects or programmes assisted by the donor communities have been launched to explore new ways to reach sustainable water supply. The World Water Day, celebrated by the UN on 22 March, puts emphasis internationally on the use and reuse of water. However, despite all initiatives, the lack of drinking water is still running high on the agenda especially in the rural area.

Lot of studies and research were carried out on best utilization, wastage, management and sustainability of water. Following are some of the Literature references supporting the present study.

Though the available literature is limited, the effort has been made to collect, collate and include the latest and relevant research findings both from global and Indian scenarios.

2.2 Global Scenario

Dadzine, (1980) studied 10 experimental projects covering from 2000 to 65000 people each, project designed to provide potable water to improve health. The project finding was low infant and child mortality. In some cases, children’s physical growth rates were also high. The economic status of the people were also observed to be increased, this is mainly due to potable drinking water supply and time saved to fetch water. Most of the people,
especially women were involved in the economic development activities in the saved time to fetch water.

Ambroggi, (1980) stated in his paper "Water" that the total quantity of fresh water on the earth exceeds all conceivable needs of the human population. Much of the water is inaccessible or otherwise unavailable, however, and the remainder is unevenly distributed both from place to place and from season to season. In most parts of the world, therefore an adequate and reliable supply of water can be had only by active management of water resources.

Purushottam Khanna, (1989) analyzed the existing and future development related environmental issues to suggest a pathway for sustainable development through relevant policy, planning, technology, organizational and implementation strategies. He also expressed that any sustainable development water supply projects must meet the needs of the present generation without compromising the ability of future generations to meet their own aspirations and needs. Sustainable development is a process in which the exploitation of resources, the direction of investments, and institutional changes are all made consistent with future as well as present needs.

Ruslan Melien, et al., (1999) presented a paper on Groundwater Quality and Rural Drinking-Water Supplies in the Republic of Moldova. They have conducted shallow ground water quality assessment and its pollution risks using GIS in two pilot areas-Balatina and Carpineni, in Republic of Moldova, which were the main sources of drinking water for rural areas. Microbiological, nitrate, and selenium contamination were most serious in the villages. Pollution occurs mainly due to poor sanitary conditions. They observed that some of the shallow ground water sources were polluted with pesticides also.
Gautom Barman, (2000) studied the various hurdles faced during supply of drinking water in hill areas of Assam. A study was carried out in the Howraghat Division of the Karbi Anglong District. He suggested following points based on the observations made during his study.

1. The hill tribes have tendency to live on the hill tops and they do not live in compact areas, hence, villages are small and scattered. Therefore, continuous water supply system for those hilly areas was suggested, because the tribes have no proper storage facilities.

2. The use of PVC pipe in hilly area was also a problem, because villages are scattered and the villagers pierce these pipes to collect water in front of their houses or supply water to their agricultural fields.

Grant Mackintosh and Christine Colvin, (2003) studied the reasons for failure of rural water supply schemes in South Africa to provide potable water. They studied the results of water samples collected from the drinking water supplied for rural communities in the Western and Eastern Cape, South Africa. The majority of samples collected failed microbial drinking water quality standards resulting high infant annual deaths due to diarrhea. Following were the observed reasons for the failure of rural groundwater schemes to deliver adequate quality drinking water.

- Failure of the pump, forcing people to use water from contaminated sources
- Contamination via the storage reservoir
- Failure to chlorinate
- Inadequate or non-existing water supply management
- Failure to prevent or no impact of microbial pollution
- Failure in water quality management
Water, even in its natural environment, contains some level of impurities. Water is nearly a universal solvent. The exploitation of groundwater by means of boreholes for supplying small user groups and rural communities with water has been widely applied in certain parts of the world for several decades. In recent years, this practice has spread all over the globe, and hundreds of thousands of boreholes have been drilled to tap low-yield aquifers. It is evident that such boreholes require hand pumps for lifting the water.

2.3 Indian Scenario

Maduskar (2000) studied the various factors affecting tariff management for distribution system in Mumbai city. He stated that any management or administration has relevance to the objectives of the entity and aims at achieving those objectives to the extent possible. These objectives in turn are determined by the policy of the entity. Policy in turn determined by number of factors which becomes a complicated process, but at the same time it becomes difficult to separate out the impact of each factor.

He studied the factors affecting non-functioning of meters, which directly affect tariff management.

- Absence of preventive maintenance
- Intermittent water supply
- Quality of water
- Wrong placement of the meter

Sharma (2000) presented an article on Socio-economic Aspects of Water in 32nd Annual Convention of the Indian Water Works Association held at Bhopal. He stated that, in order to take stock of global water resources, it is important to understand the solar driven hydrological water cycle. This cycle traces the successive changes of water as it moves from the ocean, through precipitation, transpiration, percolation, infiltration, evaporation, and
then back to ocean. He also expressed that this cycle plays an important role in the world water supply system. He also stressed the importance of socio-economic aspect of water, like global water resources, estimated global water use and consumption, reclamation of wastewater and need of groundwater regulation.

Most of the individual village water supply schemes were based on ground water sources. This is one of the more effective factors from operation and maintenance point of view, the only short coming being less reliability of ground water in summer. When assured quantity of water of desired quality is not available locally, several villages are grouped together and are served water through a regional rural water supply schemes. Domkondwar (2000) studied the configuration of large Regional Rural Water Supply Scheme by locating Zonal Balancing Reservoirs at centre of groups of villages and thus maintains of adequate velocities in pipelines reducing the capital cost substantially.

Bhave and Rajesh Gupta (2000) studied the Design, Performance and Operation of Regional Rural Water Supply Systems. They compared the earlier design and present design with respect to Hydraulic Gradient Level (HGL). They observed that the earlier design was based on the experience and judgment of the designers, it results in some over design with available HGL values more than the minimum required ones at almost all nodes. The present designs based on linear programming principles, therefore, such designs are the ones with global minimum cost.

Groundwater Recharge. He also stated that in India, resources being scarce, the challenges of millennium need to be tackled with careful strategies, sound policies and that too with the least cost to achieve the goals, for this appropriate technology, legislation, inter-sectoral co-ordination, effective implementation and management have to be taken into account along with the political will.

In 1995, the World Bank Group assisted Jordan Government in its privatization programme of water supply sector. Kiran Joshi and Mandar Pimputkar (2001) studied the effects and success of the programme. They concluded that privatization of major infrastructure public sector enterprises is complicated, requires broad-based consensus and takes time to do transparently.

Mismanagement of water and land resources is leading to issues viz., human health and sustainable social and economic development at risk. Explosive growth of urban areas, unsustainable exploitation of natural resources, uncontrolled industrialization, increasing water demand for food production and expanding populations lacking proper environmental sanitation have led to progressive depletion and degradation of freshwater resources.

Karthikeyan et al., (2003) presented a paper on Towards sustainable management of water resource in rural water supply projects in India. In their paper, they expressed that tackling and resolving India's water resources management problems will not be easy and by its nature, water resources management is multi-dimensional and complex.

Watershed development programmes provide an opportunity for sustainable management strategies, although currently, they remain largely supply-side mechanisms of water resources development. Hydro-geological
conditions, community participation and status of groundwater usage were important in evolving strategies on demand-side groundwater management.

Himanshu Kulkarni, et al., (2004) have studied on Development of a Sustainable Groundwater Management System for Neemkheda Watershed in dry land reasons of Madhya Pradesh State. They expressed that geophysical surveys, detailed hydro geological mapping and sustained monitoring of wells helped describe the groundwater resources in watershed.

2.4 Community Participation

The concept of community participation has become a standard slogan in development projects, including the water and environmental sanitation sector. Different actors and partners interpret it differently according to their knowledge, experience and convenience. Balachandra Kurup (2001) stressed the necessity of community participation in the Rural Water Supply & Environmental Sanitation Projects and its importance.

Basic water and hygiene services that were developed as part of sustainable development were thus not dependent on continued external support for their ongoing service delivery and use. A sustainable development stressed that development must be participatory, and it must involve local people in the decision making process that affects their lives. In this context, the people's participation in the rural water supply development programme becomes essential. Hence, facilitating processes in rural communities to strengthen the capacities of people to manage their water supply system is fascinating, and such processes are not predictable, because of the specific characteristics of each community, and one has to deal with setbacks and conflicts.

Mazumdar (2001) expressed his personal experiences about the Community Participation in Rural Water Supply Programme.
Kumar (2001) in his paper has expressed that it is essential that a large section of rural population needs massive sanitation and motivation for adopting sanitation in their households. Technology and IEC play a vital role in this regard.

Personal hygiene includes behaviour such as hand washing with soap or ash after defecation, before contact with food, safe drinking water collection, storage and handing. These are very important from the health point of view. In this context, various governmental and non-governmental organizations are working to give training and to create awareness among the people about the personal hygiene and its importance in the rural areas. The Society for Community Organization and People's Education (SCOPE) runs school health programs in 30 village schools in Tamil Nadu State. Their experience has been that “A convinced child is a committed advocate” of improved sanitation behaviour. The impact of the school hygiene education program is not limited to the school children, but affects the wider community as well, because children influence the hygiene behaviour of their families, peers and neighbours. Mahalaxmi, a 10 year old student in the fifth grade tried to convince her parents to construct a latrine after learning about the faecal-oral transmission route at school. Surprisingly, her mother was the hardest to convince out of her whole family. Finally the family decided to construct a latrine. Now the whole family has changed from their previous practice of open defecation in the fields and uses the family latrine.

The raw materials required for the construction of low cost latrines should be made available at village level with appropriate low cost technology, otherwise promotion of latrine at village level is a very difficult task. The Society for Education, Village Action and Improvement (SEVAI) has created reliable links between suppliers of raw materials, production centers,
sanitary marts, masons and households in Water Aid project area close to Tiruchchirapalli in Tamil Nadu.

Water became a state property after independence and community managed systems were taken over by the state. Water management was entrusted to the bureaucracy controlled by formally elected representatives of the people. The provisions of the acts have been inadequate to ensure efficient, sustainable and equitable use. They were not linked to a clearly defined policy framework regarding property rights in water, entitlement for livelihood needs, priorities of use and allocation. Datye (2003) presented a paper on Water Policy, Law and Institutions. In his paper he stresses the necessity of water policy and the acts necessary to ensure efficient, sustainable and equitable use of water. He also expresses the importance of implementation of policy with user initiatives.

The concept of participation in rural development has been evolutionary for the past two decades with those involved, such as development agencies and governments, particularly in rural water supply, re-evaluating their active role. The move towards effective community participation has encouraged a shift from traditional top-down to a bottom-up approach whereby there is a decentralization of unevenly distributed resources and power to empower a community and allow mobility of ‘people participation’. The Molinos water project is the first large-scale development project of its kind introduced in the village of Molinos in an under developed area of Chile. Tarisai Garande and Suzan Dagg (2005) studied Public Participation and Effective Water Governance of Water project at Molinos of Chile. They found that the governance at the local level to be effective, participation should be inclusive and communicative so as to enhance transparency through the project lifetime.
Carolyn Hannan and Ingvar Andersson (2004) studied the Gender perspectives on water supply and sanitation towards a sustainable livelihoods and ecosystem-based approach to sanitation. They stated that the water supplies and sanitation are critical elements in a sustainable livelihoods strategy, being directly related to issues of access to and control over natural resources as well as basic infrastructure and services. They also said that 4 billion people – half the world’s population - will live in countries with high water stress by year 2025. Most of the affected countries are located in the South and poor people will be the main victims.

Water – the precious gift of nature is to a large extent a mismanaged resource globally. In spite of the growing level of investment as well as considerable progress made in the water supply sector all over the world, providing safe water to the served and under-served has been seen the most challenging task by the developing countries. The local governments are also becoming increasingly important factor in the management schemes of existing utilities. Ramesh Chandra Panda (2002) studied the importance of Community participation in rural drinking water supply towards sustainability of the scheme.

2.5 Summary of Literature Review and Gaps Identified to Pursue Present Research

A detailed literature review of various papers from international and national journals on water supply and sanitation has clearly shown that in India, research work on Impact of water supply and sanitation on Quality of Life, in rural areas is scanty.

In the past three decades, globally, though several researchers elsewhere have done considerable work on water supply and sanitation, there are still several gaps, specifically the information is inconclusive with respect to:
• Studies carried out on water pollution and its effects on human health
• Assessment of community participation in rural water supply and sanitation programme, an Institutional approach
• Lack of papers on Improvement of Quality of Life with respect to water supply and sanitation programme
• Innovative idea of using IEC materials to create awareness about personal hygiene
• Only socio economic aspects of water
• Ground water management

In this context, the present study proposes to fill the voids identified in terms of impact evaluation of water supply and sanitation sector and Quality of Life in Rural Areas.