



GOVERNMENT OF KARNATAKA

**STRATEGY
PAPER
ON
RURAL WATER SUPPLY &
SANITATION
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CHAPTER I

INTRODUCTION

1.0 BACKGROUND

This document presents a strategy for supply of drinking water in the Rural Areas of the State of Karnataka. It also outlines an approach to promoting rural sanitation in order to upgrade the quality of life in the villages. As a prelude to the presentation of the major issues involved, it is pertinent to discuss briefly the factors which influence the availability of water resources, affect consumption of water and influence the sanitation practices of people in different parts of the State. The important factors are, inter alia, the following:

- Location
- Topography
- Geology
- Water Resources
- Rainfall and Drought
- Temperature and Climate
- Forest
- Area and Population
- Pattern of distribution of rural habitations, and
- Occupational patterns of rural households.

With an analysis of the above, the planners will be able to make an assessment on the availability of water resources and the requirements of water for human as well as cattle population in different parts of the State. It may be kept in mind that requirements of water vary from region

to region, district to district, and even from one taluk to another of the same district. While providing drinking water to any particular region/district/taluk, these factors should be kept in view and a rational approach to the mode of supply vis-à-vis per capita rate of consumption should be adopted. Even in the promotion of rural sanitation, regional variation in the above factors would necessitate suitable adjustment in the strategies adopted.

The following paragraphs discuss briefly these factors with regard to the State of Karnataka.

1.1 LOCATION

Karnataka is located between $11^{\circ} 31'$ and $18^{\circ} 45'$ north latitudes and $74^{\circ} 12'$ and $78^{\circ} 40'$ east longitude. It lies in the west-central part of Peninsular India. It is bounded by Maharashtra and Goa on the north and northwest respectively, on the east by Andhra Pradesh, on the southeast by Tamil Nadu, on the west by the Arabian Sea and on the south - west by Kerala.

1.2 TOPOGRAPHY

The State is divided into four district physiographic divisions. These are

- The Coastal Area
- The Western Ghats or the Malnad
- The Northern Maidan
- The Southern Maidan

The map at ANNEX - I shows the Physiographic Division of the State of Karnataka.

1.2.1 The Coastal Area

The western portions of the districts of Dakshina Kannada, Udupi and Uttara Kannada are in the coastal plains region. The Coastal line has a length of about 400 kms. The plains of the Kali, the Gangavali and the Sharavathi rivers border it. The coastline in the north is about 30 kms in width for narrow stretches. In the south this is wider with a maximum width of 70 kms near the port of Mangalore.

Three roughly parallel belts of land formations are noticed in the coastal plains of Karnataka. Along the shore, a narrow belt of deposits of sand dunes, estuarine mud flats and valley plains which makes for a flat and in places gently sloping terrain with an average elevation of 30 meters is noticed. East of this, running parallel, are the higher erosional platforms at a general height of 60 meters for a width of 25 kms in the south and dissected by steep valleys. Further east is a belt of isolated clusters of hills with an elevation of 90 and 300 meters.

1.2.2 The Western Ghats or the Malnad

The eastern parts of the districts of Dakshina Kannada, Udupi and Uttara Kannada, the district of Kodagu and the western portions of the districts of Mysore, Hassan, Chickmagalur, Shimoga, Dharwad and Belgaum form parts of the western ghats.

The Western Ghats are haphazardly placed hills. This region runs from NNW to SEE for about 320 Kms. The ranges are comparatively steep towards the western side draining rainwater into the rivers of the Malnad and finally into the Arabian Sea. Similarly, they are gentler towards east and drain rainwater into the Bay of Bengal through well-laid river systems.

The Malnad region is slightly higher than the Karnataka plateau, but rugged with a number of hills that receive larger amounts of rainfall and are characterised by forest through deep gorges, waterfalls, river captures and the watersheds, interlaced with denser evergreen and semi-ever green forests. The northern parts of this region are about 450 to 600 meters and southern parts are with 900 to 1500 meters in elevation. The terrain and rainfall combine gives Malnad a different human geography from that of western coastal plains and the maidan lying east.

1.2.3 The Northern Maidan

The eastern portions of Dharwad and Belgaum districts and the districts of Haveri, Bellary, Gadag, Koppal, Raichur, Bagalkote, Bijapur, Gulbarga and Bidar come under the northern maidan region.

The northern maidan provides a mountainous treeless plateau landscape. The river plains of the Krishna, the Bheema and the Tungabhadra with the intervening watersheds are in the northern maidan.

In the northeastern region of Karnataka drained by Krishna and its tributaries, erosional topography with residual hills is noteworthy. These valleys open out to form undulating surface features. The Mahadeo range ending at Bijapur acts as the watershed between Bheema and the Krishna.

South east of this tract, outcrops of quartzites, lime stones and shales take the form the residual hills of the Malaprabha and Ghataprabha. Southeast of these hills is a plain with an undulating surface drained by Malaprabha rivers and its tributaries. The south is also partly drained by Tungabhadra. Northeast of the Sandur hills cover much of Raichur and Bellary districts and goes north right up to Bidar hills. The elevation of Plains is between 300 and 450 meters. An

extension of this plain of black soils is found westward up to Horti hills and beyond the state border.

1.2.4 The Southern Maidan

The eastern parts of Mysore, Hassan, Chickmagalur, Shimoga districts and the districts of Bangalore (Rural), Mandya, Bangalore (Urban), Kolar, Tumkur, Chitradurga, Davanagere (part) come under Southern Maidan region.

The Maidan is characterised by an undulating landscape with broad-based valleys. The Southern Maidan is a relatively flat plateau rising between 900 to 1200 meters in the south. The upland consists of a series of granite hills in Tumkur and Kolar districts. The eastern stretch is the well defined Biligiri-Rangana hills with a width of 16 to 30 Kms running up to Pavagada, appearing in clusters like Narayanadurga hills between Hemavathi and Shimsha rivers, Devarayanadurga between the Shimsha and Arkavathi rivers, Nandidurga between the Arkavathi and Ponnaiyar rivers. The main ridge also lies between the Cauvery and Tungabhadra rivers.

1.3 GEOLOGY

1.3.1 The Coastal Area

The region is principally made up of sandstone and laterite deposits. It covers about 3200 sq kms in extent and includes perhaps much of the laterite deposits. Underlying that there may be cuddalore sandstone and warkalli bed formations. The recent formations seem to consist of alluvial deposits along the coasts. Other coastal deposits along the riverbanks are estuarine (backwater) deposits, blown sands along the

coasts the thin lime shell beds occurring in places in Mangalore, Udupi and Kundapur taluks.

The above Geological formations come under the coastal region of three districts namely Dakshina Kannada ,Uttara Kannada and Udupi

The ground water availability of the coastal region is good because of the coastal rock formations mainly being sandstone and laterite. This rocks show very good porosity and permeability, but the storage capacity is moderate. The ground water reserve is higher in Uttara kannada district as the area is covered by forest and it receives heavy rainfall. In addition, many streams and rivers from Western Ghats flow towards the Uttara Kannada recharging the aquifer continuously.

1.3.2 Western Ghats or the Malnad

The Western Ghats region shows schistose type of rocks covering in the aggregate about 1,600 sq kms separated from granitic areas. They are exposed formations of the steep scarps of the Western Ghats. The schists run along this line from the northernmost part of the western ghats for a distance of 240km, then in south of Shimoga belt.

The ground water sources in Western Ghats are poor to moderate, because of high run off and low infiltration. In this region even though the rainfall is more compared to the other regions the recharge is less because of hard rocks and steep slopes. In the southern parts of Western Ghats the rocks are highly jointed and fractured. Therefore, the ground water percolation is very deep and sub-surface (ground) water is not readily available at reasonable depths.

1.3.3 The Northern Maidan

In the central part of the region, the closepet granitic belt runs east of Bellary and Raichur districts. Further, a closepet granite belt runs

east to west for a width of 8 to 10 km in the centre of the region. To the east of this belt up to the state boundary in Bellary, Raichur and Gulbarga districts, a younger gneissic rock belt is running. Towards north of Dharwar in the eastern end of Bagalkote for a length of about 160 km east to west and a width ranging from 40 to 60 km horizontal there is a system of sedimentary rocks unconformably the crystalline schists of the Dharwar system. This belt is called "Kaladgi series". East-north-east of Kaladgi series for a length of 175 kms and a width ranging from 16 km to 32 km runs the "Bhima Series" named after the river Bhima. The formation rests unconformably on the Archean formations and is overlain by Deccan Trap. Further north of Kaladgi and Bheema series, Deccan Trap occurs in the northern border of Karnataka state, running from Belgaum in an east-north direction for a length of about 450 Km with a width ranging from 40 km to 110 kms. This covers about 25,600 sq km in the districts of Belgaum, Bijapur, Gulbarga and Bidar districts, except for a formation of tertiary to quaternary of small width in the borders of Gulbarga and Bidar districts.

The area under gneissic belt and schist belt is having good porosity to hold groundwater. But the ground water is saline and brackish even in the command areas of reservoirs due to existence of black cotton soils

1.3.4 The Southern Maidan

The Central range closepet granite belt, called Ramanagar-Rayadurga range, runs in the state with a width varying from 16 km to 24 km from south, Shivanasamudram to Molakalmuru in the north through the districts of Bangalore, Tumkur and Chitradurga. This closepet granite belt in eastern range also forms a group of isolated hills parallel to the general trend of Eastern Ghats at Kolar, Chintamani, Bagepally and Gudibanda taluks of Kolar districts. The younger gneissic

complex belt is observed around Bangalore, west and northwest of Kolar districts. The older gneissic complex belt is distributed in almost all parts of Southern maidan region towards west of closepet granite belt, except Dharwar schist belt (Bababudan group) in parts of Chikkamagalur, Tumkur and Chitradurga districts.

Hydrogeologically, the rock types in the area could be classified as "unsuitable" for ground water development. But the joints and fractures enable these hard rocks to hold and transmit water. The gneissic belt and schist belts in the region are having porosity to hold ground water.

ANNEX - II shows the geological division of the State of Karnataka

1.4 WATER RESOURCES

Karnataka is blessed with surface water resources in its numerous rivers and streams and to a limited extent in its ground water resources.

The surface water resources are attributable to the different river systems namely the Krishna, the Godavari, the Cauvery, the West-Flowing rivers, the Palar, North Pennar and South Pennar. The average annual flow of the state is estimated to be of the order of 100,000 M. Cum, which is roughly six percent of the country's water resources.

A brief description of the course of the major rivers and their tributaries, which together form the river basins of the State, is given in sections 1.4.1 to 1.4.6.

With regard to ground water, it has been estimated that the Net Amount of Recharge (NAR) in the state is about 15, 42, 481 ha m (hectare metre). Against this, the Net Annual Utilisation (NAU) as on 31/3/1991 is about 5,76,921 ha m, that is, approximately 37% of the NAR.

Status of "ground water development of the taluks which are considered as critical" from the point of view of exploitation of ground water is presented in ANNEX-III.

1.4.1 The Krishna

The river Krishna rises in the Western Ghats just north of Mahabaleswhar in Maharashtra State. It enters Karnataka State and passes through Belgaum and Bagalkote districts. It goes further along the borders of Bagalkote and Bijapur districts and enters into the borders of Raichur and Gulbarga districts. Then it flows through the State of Andhra Pradesh to empty itself into the Bay of Bengal. The total length of Krishna is about 483 kms in Karnataka out of the total length 1400 kms.

The major tributaries of the Krishna flowing in the State are the Bhima, the Tungabhadra, the Hiranyakeshi, the Ghataprabha and the Malaprabha.

Krishna basin in the State covers 17 districts, eight of which are wholly in the basin (Bellary, Bijapur, Bagalakote, Chitradurga, Davanagere, Gulbarga, Koppal and Raichur) and nine are partly located in the basin. These are Belgaum, Dharwar, Gadag, Chikkamagalur, Shimoga, Tumkur, Hassan, Bidar and Uttara Kannada. The total basin of Krishna is about 25,000 sq .km together with its tributaries. It drains about 704 kms length of the Western Ghats, the chief source of the Krishna waters. In Karnataka State the catchment area of Krishna River is 1,13,271 sq kms which is about 59% of the total area of the state. The estimated average flow of Krishna is 27,500 M cum.

1.4.2 The Cauvery

The river Cauvery has its origin in the Western Ghats in Kodagu (Madikeri) district of Karnataka State. The Cauvery River flows from Kodagu to Mysore and then Mandya district. Once again it enters into

Mysore district and further flows along the border of Mandya, Bangalore Rural and Chamarajanagar before it enters Tamilnadu. Out of its total length of 804 Kms, 320 Kms are in Karnataka State.

The major tributaries of Cauvery in Karnataka are the Hemavathi, the Lakshmanatirtha, the Harangi, the Kabini, the Suvarnavathi, the Lokapavani, the Shimsha and the Arkavathi. In addition, there are two rivers namely, Mayor and Palar. The former forms the boundary between Mysore and Nilgiri and the later between Mysore and Coimbatore district of Tamilnadu.

The Cauvery basin covers 18% of the State area comprising eight districts. The whole of Mysore, Mandya and Chamarajanagar and parts of Kodagu, Chikkamagalur, Hassan, Tumkur and Bangalore (Rural) districts lie in the basin. The area of the basin in Karnataka State is 34,273 sq kms, which is 17.87% of the area of the State. Its average annual flow is 11,000 M cum.

1.4.3 Godavari river basin

The Godavari river does not flow in the State. However, two tributaries, Manjra and Karanga, which flow through Karnataka, form part of the Godavari basin in the State.

1.4.4 Uttara Pinakini

An inter-state river, the Uttara Pinakini, flowing in Karnataka and Andhra Pradesh rises in the Chenna Keshava hills of the Nandidurga range in Karnataka. It flows in a northwesterly direction through the Kolar and Tumkur districts for a distance of 48 kms before it enters Andhra Pradesh. After flowing 67 kms through the Hindupur and Penukonda taluks of Ananthpur districts the river re-enters Karnataka and cuts across the Pavagada taluk of Tumkur districts for a distance of 13 kms. The length of the river in Karnataka is 61 kms out of total of 597 kms. The principal tributaries of the river in Karnataka are the

Jayamangali in Tumkur district, the Chitravathi and Papagni in Kolar district. Out of the total drainage area of 55,213 sq kms, it drains 6937 sq kms in Karnataka.

1.4.5 Dakshina Pinakini

Another inter-state river the Dakshina Pinakini flowing in Karnataka, Tamilnadu and Pondichery rises near Harvashettyhalli village in Kolar district at an elevation of about 900 m in the hill ranges of Nandidurga. After flowing for a distance of 79 km in Kolar and Bangalore districts it enters Tamilnadu.

1.4.6 West flowing rivers

There are numerous west-flowing rivers, chief among them are Sharavathi, the Kali, the Gangavali (Bedthi), the Aghanashini and Netravathi which rise on the western side of the Ghats and drain into the Arabian Sea through the districts of Uttara Kannada, Dakshina Kannada and Udupi. The total catchment area of all the west-flowing rivers is 26,214 sq km and their average annual flow is 57,000 M cum.

1.4.6.1 Netravathi

The Netravathi is the biggest river in the Dakshina Kannada districts with a total length of 96 km and catchment area of 3,335 sq km. It takes its birth near Samse in Chamadi range of hills. The main tributaries of the Netravathi are the Neriya hole, the Kumaradhara, the Bethagadihole and the Shishilahole. It joins the Arabian Sea in the vicinity of Mangalore.

1.4.6.2 Kali

The Kali, a major west flowing river takes origin in the Western Ghats in Uttara Kannada districts, with a catchment area of 4,841 sq kms. It joins the Arabian Sea at Karwar after covering a total length of

184 km. The major tributaries of this river are the Pandari, the Tattihalla, the Kaneri and the Vaki.

1.4.7 Irrigation System

The irrigation systems in the State are a potential source of drinking water supplies in their respective command areas. Some of the major irrigation projects which are completed are: Krishnarajasagara (Mandya), Hemavathi (Hassan), Kabini (Mysore), Harangi (Kodagu), Vanivilas Sagar (Chitradurga), Tungabhadra (Bellary), Bhadra Reservoir (Chikkamagalur), Ghataprabha (Belgaum), Malaprabha (Belgaum), Upper Krishna (Bijapur), Karanja, (Bidar) Varahi (Dakshina Kannada), Bennithora (Gulbarga), Hippargi Barrage (Bijapur) and Nugu (Mysore).

In addition, there are a number of medium irrigation projects. Mention may be made of a few of the medium irrigation projects, which are completed. These are Tunga Anicut, Anjanapur, Chandrampalli, Hagri Bommanahalli, Ambligola, Dharma Reservoir, Rajoli Banda diversion scheme, Hathikone, Konakanala, Ramanahalli tank, Jambadahalla, Narihalla, Kolchi weir, Areshankar, Kalaskop, Chitwadgi, Nagathana, Gundal Chikhole, Suvaranavathi, Hebbanaholla, H.D. Kote, Mangola and Bachanki.

1.4.8 Tank Systems

In the olden days construction of tanks was considered a meritorious act both for irrigation and drinking water supplies. In the old Mysore State almost every valley contains a chain of tanks, the first overflowing into the second and so on until the terminal tank is filled. Thus, there existed an elaborate network of tanks in the old Mysore State. Major Sankey, one of the first engineers of the old Mysore State, devoted his attention to the systematic repairs of tanks. He stated that

"to such an extent has the principle of storage been followed that is would now require some ingenuity to discover a site within this great area suitable for a new tank".

There were 2567 major tanks with an atchcut of 4,48,302 acres and 22,762 minor tanks with an extent of 3,50,242 acres in the year 1956 in the Mysore State. After re-organisation of the state in 1956, 11,519 tanks with an atchcut of 2,17,300 acres were transferred to the irrigation department. The Government of Karnataka further invested in improvements and construction of new tanks in the Five-Year-Plans. Up to end of 5th Five-Year Plan works in about 19,623 tanks were taken up and completed benefiting 4,06,409 hectares of existing (old) atchcut and 3,52,845 hectares of new atchcut.

Now, most of the tanks are silted up and need to be desilted. Government of Karnataka is having a programme to desilt the tanks by mobilising resources from internal and external sources. This will improve the storage capacity of the tanks both for irrigation and drinking water and at the same time underground aquifer will be recharged thereby increasing the ground water potential. Simultaneously, this will also decrease the potential health hazard of chemical contamination by diluting the concentration of the contaminants in ground water.

1.5 RAINFALL AND DROUGHT

1.5.1 Rainfall

The state receives two monsoons. The Southwest (June to Sept) and Northeast monsoons (October to November); both give major portion of the rainfall in the State. Analysis of rainfall data for the period 1901 to 1980 indicates that the State receives 80% of the annual rainfall during monsoon period, 12% in the post -monsoon period, 7% in summer and only 1% in the winter.

There are two rainfall deficit areas in the state with 500-600 mm of rainfall. These areas cover Bijapur, east Belgaum, Dharwad and Raichur district as well as east Bellary, Chitradurga and a small portion of Tumkur district. Lowest annual rainfall, less than 200 mm of rainfall, is recorded in the very dry areas of Challakere, Pavagada, Madhugiri and Bellary.

There are few orographically favourable locations, where extremely heavy rainfall is recorded, such as Agumbe (8276 mm) in Shimoga district and Bhagamandala (6023 mm), Pullingoth (5941 mm) and Makut (5054 mm) in the Kodagu district.

The Region-wise/ District-wise annual rainfall during the last decades is presented in ANNEX - IV.

1.5.2 Droughts

About two-thirds of the area of the state having 750 mm or less annual rainfall is considered drought-prone. There are more droughts in June to September season than in the year taken as a whole. Considering only moderate and severe drought, the prominent years of draught in the past were 1899, 1905, 1908, 1911, 1918, 1920, 1934, 1965 and 1972, when six or more districts had moderate or severe drought. On the average, the northern districts have more moderate or severe droughts than the southern districts. The districts, which had the largest number of years of moderate drought, are Bidar, Gulbarga, Raichur and Tumkur. Taking all droughts into consideration, the largest number, (30 in 75 years) have been in Bidar and Raichur districts. The total number of all categories of drought is highest in Mandya, Mysore, Kolar, Tumkur and Chitradurga districts being 32 in 75 years.

It has been found that there exists no definite periodicity in the occurrence of drought although there is a slight tendency towards a

periodicity of about three years in the northern districts of the State. Although there is no regular periodicity, considering the number of years of drought occurrence over a long period, it is found that the average recurrence period of draught is once in four years in the southern districts and once in three years in the northern districts.

1.6 TEMPERATURE AND CLIMATE

1.6.1 Temperature

The minimum temperature is recorded in the early January. The mean daily temperature varies from 31°C to 32°C in coastal areas to 24°C to 27°C in ghat areas. This will be a little above 30°C in northern maidan area and 27°C to 29°C in the rest of the State (southern maidan).

May is the hottest month over a major part of the State. The temperatures reach 35°C to 36°C in coastal area, 32°C to 34°C in western ghats and Malnad areas, 36°C to 38°C in the southern maidan and exceed 40°C in Bidar - Gadag - Bellary area and 43°C in Gulbarga - Raichur area of northern maidan. The temperature decreases after May and appreciably by July. After October, temperature gradually decreases throughout the State reaching the lowest in the beginning of January.

1.6.2 Climate

The tropical monsoon climate covers the entire coastal belt and the adjoining area. The southern half of the state experiences hot, seasonally dry typical savana climate. On the other hand, the northern half, by and large, experiences hot semi-arid, typical steppe type of climate. About two-thirds of the area of the State is arid or semi-arid. This amounts to 15% of the total semi-arid and 3% of the total arid areas of the country.

1.7 FOREST

1.7.1 Area and distribution

The total forest area of Karnataka State is 36,384.06 sq km against the geographical area of 1,92,791 sq km. The percentage of forest area to geographical area is 20 as against the all India percentage of 23 AND THE TARGETTED 33% prescribed in the National Forest Policy.

It may be seen from ANNEX-VII that the average forest coverage in the Coastal Region is 67%, in the Western Ghat region it is 27%, and in the Southern Maidan and Northern Maidan regions, these figures are 15% and 10% respectively.

1.8 AREA AND POPULATION

1.8.1 Area

The Geographical area of the State is 1,91,791 sq kms. This accounts for 5.83 percent of the total geographical area of the country.

1.8.2 Population

According to 1991 Census, the population was 44,977,201 with 22,951,197 Males and 22,025,284 Females. 69.08% of the population live in rural areas and 30.92% in urban areas. The percentage growth rate during the decade 1981-91 was 21.12 against 26.75 during 1971-81.

1.8.2.1 Population Density

The State had a density of population of 193 in 1981. Bangalore district has the highest density (615) among the districts of the State.

Mandya (285) and Dakshina Kannada (281) districts come next, as they are prosperous agricultural areas. Belgaum, Dharwad, Kolar and Mysore districts form zones of high density. The Malnad districts and the northern maidan districts of Bijapur, Bellary, Gulbarga and Raichur have densities lower than the State average. Kodagu and Uttara Kannada districts have the lowest densities, as these are areas of plantations and of forests. Among the districts of Malnad, Shimoga has a high density possibly in view of the location of industries at Bhadravathi etc.

1.9 PATTERN OF DISTRIBUTION OF RURAL HABITATIONS

An important factor that influences the strategy for promoting water supply and environmental Sanitation in the rural areas is the varying pattern of rural habitations in different parts of the state. As generally understood, a village or a Hamlet in Karnataka is a cluster of residential houses located within an area of usually about a square kilometer and linked by a network of roads/streets. These houses typically share many common facilities like water supply, street lighting, drainage network, community halls, and schools. The number of houses in the villages may vary greatly depending upon whether a village is small or large but the other characteristics will be common to all such villages.

The above description, while true in the case of a majority of the villages in the state, has very important exceptions. Notably, many villages and hamlets in the coastal region and the Malnad region (the Western Ghats) differ considerably from the above pattern. In these regions the households in any given village are scattered over a wide area (usually over the entire area of a revenue village as a unit of land survey) and are not necessarily linked by a network of streets and lanes. Often

each house is located in a separate farming unit or a homestead and any drainage or road is to be provided independently to such a house. Needless to say that in villages of this kind only a limited number of facilities like a village school or community hall are shared by the entire village and providing common environmental sanitation facilities is not feasible in many such villages.

Out of the 56682 rural habitations in the state, 31741 habitations are located in the Northern and Southern Maidan regions and account for 79% of the State's rural population. The remaining 24941 habitations are located in the coastal region and the Malnad area.

1.10 OCCUPATIONAL PATTERN OF RURAL HOUSE HOLDS:

Another important socio economic factor that influences rural water supply sanitation is the occupational pattern of the households in the rural areas. The rural households in the state depend mainly on agriculture and allied occupations. Further, agriculture in the state is predominantly non mechanised and depends on cattle for the draft power in various agricultural operations. Cattle and other livestock contribute significantly to the household demand for water particularly during summer months and in arid areas when open sources of water around the village dry up. Traditionally, agriculturists in Karnataka also keep their cattle in their dwelling houses at night. This has very important implications to household sanitation as the solid waste generated by a rural household has significant parts of cow dung, fodder residues etc., and maintaining household hygiene needs to take into account the requirement of disposing of cow dung and other waste materials on a daily basis.

CHAPTER II

RURAL WATER SUPPLY IN KARNATAKA: EVOLUTION OF POLICY

2.0 EARLY DEVELOPMENT

2.1 THE PERIOD - 1954 to 1980

Rural Water Supply is a State subject. Accordingly, funds were provided in the State budgets for the development of this sector right from the commencement of the First Five-Year Plan. A National Water Supply and Sanitation Programme was introduced in the Social Welfare Sector in 1954. During the initial years, the program mainly was devoted to the construction of open wells in habitations having no drinking water wells and where the number of open wells was not adequate. These works were being executed with peoples' participation.

During 1960s, it was observed that only easy habitations were being repeatedly attended to leaving the difficult habitations to their fate. Recurring droughts in the State made the situation worse. Ground water table fell, and the open wells went dry and the people faced serious scarcity of drinking water. At this juncture, the State Government felt the need to develop deep bore-wells particularly in hard-core-habitations. Measures for the development of ground water were initiated in 1966, when an independent Directorate of Ground Water Supply and Investigation in the Department of Mines and Geology, was created. A bore-wells programme was started by the Government of Karnataka through the Minor Irrigation and Public Health Engineering Department in the year 1971 with the help of 5 drilling rigs received from the UNICEF.

For the successful implementation of the programme it was found necessary to identify areas of water scarcity and lay down priorities

among them. The criteria for identification of difficult habitations were as under:

- ◆ Habitations without any sources of water or where the sources of water were inadequate;
- ◆ Habitations having no source of water within a distance of 1 mile (1.6 kms)
- ◆ Habitations where source of water was available at more than 50 ft below ground level (bgl);
- ◆ Habitations where available water was chemically contaminated;
- ◆ Habitations where sources of water were not perennial; and
- ◆ Habitations where water-borne diseases were endemic.

It was stipulated that one bore-well for every 250 population would be provided under the program. The assumption was that one bore-well (HP) could deliver 10,000 litres per day to meet the demand of 250 persons @ 40 litres per capita per day (lpcd).

Taking into account the magnitude of the problem and to accelerate the pace of coverage of problem habitations, the Central Government introduced the Accelerated Rural Water Supply Programme (ARWSP) in 1972-73 to assist the States and the Union Territories with 100% grants-in-aid to implement the schemes in such habitations. This programme continued till 1973-74. But with the introduction of the Minimum Needs Programme (MNP) during the Fifth Five Year Plan (from 1974-75), it was withdrawn. The programme was, however, reintroduced in 1977-78 when the progress in the supply of safe drinking water to the identified problem habitations under the Minimum Needs Programme was not found to be satisfactory.

2.2 1980 - ONWARDS

Till 1980, there was no separate agency exclusively for Rural Water Supply in the State and the PHE Department used to implement both Minor Irrigation and Rural Water Supply works. In 1980, the Public Health Engineering department with an independent Chief Engineer, was created. However, with the introduction of the Zilla Parishads and Mandal Panchayats in 1987 the PHED was reorganised. Implementation of Rural water Supply and Sanitation Programs now stood transferred to the Zilla Parishads. Nevertheless, all matters with regard to planning, design, technical guidance and monitoring were retained at the Divisional and the State Level of the Department of Public Health Engineering.

During 1980, at the instance of the Government of India, the State Government conducted a survey to identify the problem habitations on the basis of the criteria suggested by them.

The Problem habitations were identified under the following Categories

Category	Problem Habitations Criteria	Identified as on 1.4.80
Category -I	Habitations with no water source, or where water was not available within 50-ft bgl or where water is not available within a horizontal distance of 1.60 kms.	14,764
Category - II	Habitations where the water was chemically contaminated	3,037
Category -III	Habitations where water-borne diseases like cholera, typhoid, gastroenteritis, guinea worm etc. were endemic	2,202
Total		20,003

Once again, during the 7th Five-Year Plan (1985-86) the Central Government requested the State to prepare the list of problem habitations to be tackled during the plan period. The priorities were indicated as under:

Priority -I	<p>Problem habitations as already identified as on 1.4.1980 but could not be provided with drinking water facilities within the 6th Five Year Plan period</p> <p>Problem habitations subsequently identified as on 31-3-1985 based on the existing criteria, giving the highest priority to " Guinea worm affected habitations ".</p> <p>Adequate coverage of partially covered problem habitations with particular emphasis on the coverage of SCs and STs.</p>
Priority - II	New problem habitations identified with the criteria of problem habitations in which sources of water source were not available within a horizontal distance of 0.5 Km or an elevation of 15 meters in hilly areas.
Priority - III	Other problem habitations

Accordingly, the problem habitations were identified as on 1/4/1985 based on the above priorities. Out of the total 52,623 habitations (27,028 main villages + 25,595 habitations), the State Government again identified 17,132 problem habitations totally bringing the problem habitations to 37,135 (20,003 as on 1/4/1980 and 17,132 freshly identified as on 1/4/1985). The problem villages were being tackled from 1/4/1980 to bring the villages to the specified norms of supply with the help of funds allocated by the State and Central Governments and funds received from External Agencies.

The essence of the above approach of the State Government was to bring the service level of 25 lpcd within a time frame which would be enhanced to 40 lpcd in future, depending upon the availability of funds.

During the early period of 90's, the Government of India was increasingly getting the impression that only the main villages were getting attention from the service providers and the hamlets surrounding the main villages were neglected. Such a situation was prevailing in most of the States/UTs. The concept of hamlets was introduced in the year 1991. A survey was initiated by Central Government to identify the problem villages and hamlets surrounding the main villages. In the State of Karnataka also, the identification of problem villages and hamlets was taken up afresh during 1991. ANNEXURE-V indicates the number of villages, number of hamlets and total number of habitations Region-wise/District-wise in the state. In all, there are 27,076 villages and 29,606 hamlets, which accounts for 56,682 habitations in the State.

Region-wise / District-wise population of villages and hamlets is given in ANNEXURE-VI(a) to VI(d).

The Mission Approach

During the 80's, the program of Rural Water Supply was given a new dimension when a Mission approach was adopted under the Technology Mission on Drinking Water and Related Water Management, also called National Drinking Water Mission (NDWM). NDWM was introduced as one of the societal Mission in 1986 and was subsequently renamed as Rajeev Gandhi National Drinking Water Mission in 1991.

The main objectives of the Mission were:

- To cover residual problem habitations as on 1/4/1986;
- To evolve appropriate technology mix;
- To improve performance and cost effectiveness of the on-going schemes;

- To create awareness among the villagers on the use of safe drinking water;
- To take measures for sustainability of the sources and the systems.

It was during this period that an Integrated Mini-Mission approach was adopted with district as the unit. In this approach it was contemplated that all issues related to Drinking Water Supply would be tackled in collaboration with other concerned departments of the State/Central Government. Other important aspects of the Mission Approach included tackling the problem of Water Quality, Sustainability of the sources and the systems, Guinea-Worm eradication etc under respective Sub-Mission on Water Quality.

The Mission Approach continued with some modifications from time to time till the GOI issued the new "Guide Lines for implementation of Rural Water Supply Programme" in 1998. In the new Guidelines there is a qualitative shift from a supply driven approach to a demand responsive approach.

The Changing Norms

In the year 1988-89, the State Government, modified the norms of implementing RWS programme to full adequacy depending upon the availability of funds. The norms of determining priority for taking up RWS programmes were laid down as follows:

Group -I	Habitations with population more than 30 but less than 50 and which are without a single source of safe drinking water
Group - II	Habitations with population between 51 and 250 shall be provided with a successful borewell with handpump
Group - III	Habitations with population between 251 and 750 shall be provided with two successful borewell with handpumps

Group - IV	Habitations with population between 751 and 1000 shall be provided with three successful borewells
Group - V	Habitations with population between 1000 and 1500 shall be provided with four successful borewells, or one Mini Water Supply scheme out of the existing high yield borewell to give at least a service level of 25 lpcd
Group - VI	Habitations with population between 1500 and 2000 shall be provided with one Mini Water Supply Scheme out of the existing borewells or if not existing high yielding borewell is available, a fresh borewell with a Mini Water Supply Scheme shall be provided to give at least a service level of 25 lpcd
Group - VII	If the habitation is provided with Piped Water Supply Scheme or a combination of Piped Water Supply Scheme and Borewells, based on the existing status, if the per capita availability is less than 20 lpcd, it shall be supplemented by borewells or a Mini Water Supply Scheme presuming that, one borewell with HP will provide 6,750 litres/day and a Mini Water Supply will provide 45,000 litres per day to bring the service level to at least 25 lpcd
Group - VIII	If any habitation, whose population is more than 250 and is situated in tough and hydrogeologically and geographically problematic area affected with fluoride content, guinea worm disease or brackishness or is an isolated habitation situated at an elevation where it is not possible to locate a successful potable water source within the habitation and if a distant source is inevitable to be tapped, the habitation shall be provided with a distant source provided that the cost of such scheme does not exceed Rs.1.00 lakh.

2.3 PRESENT STATUS OF DRINKING WATER SUPPLY

The rural water supply program has been implemented under MNP in the State Sector and ARWSP in the Central Sector. The program has also been implemented under the World Bank Assisted Integrated Rural Water Supply and Environmental Sanitation Project as well as under the bilateral assistance programs of the Netherlands and DANIDA. As regards ARWSP, it was envisaged that the program would be

discontinued by the end of 8th five-year Plan. However, the objective of the program of providing drinking water to all habitations could not be achieved due to various reasons such as lack of sufficient funds and reemergence of Not-Covered (NC) habitations and identification of Not-Safe-Source (NSS) group of villages due to Chemical contamination of sources. Therefore the ARWSP program continues to be implemented during the 9th Five-Year Plan.

The State Government has covered almost all the habitations with drinking water facilities with varying ranges of per capita supply. The water supply schemes mainly depend on ground water sources (about 96%) for this purpose. The coverage of villages with different ranges of Per Capita Supply is tabulated in ANNEXURE-VII.

The coverage of villages with potable water has undoubtedly brought down water-borne diseases like Cholera, typhoid, gastroenteritis, dysentery, guinea-worm etc. While Guinea worm has been completely eradicated from the State, cases and deaths due to water-borne diseases have also been reduced appreciably. ANNEXURE-VIII shows the incidence of cases and deaths due to water-borne diseases in the State. The erratic nature of the incidence of cases in some years may be attributable to lack of awareness among the people.

While the introduction of drinking water supply through Hand Pumps tapping the ground water has drastically reduced the incidence of water borne diseases, consumption of ground water contaminated with excess fluoride in many taluks of the State has been responsible for incidence of crippling diseases like Dental and Skeletal fluorosis. The State Government has taken up Water Quality Analysis in all taluks and has identified a large number of Villages/Hamlets affected with excess chemical content including Fluoride. ANNEXURE-IX shows the district-wise distribution of quality affected sources as per the surveys completed so far.

CHAPTER III

WATER SUPPLY; APPROACH TO THE MASTER PLAN

3.0 FACTORS THAT INFLUENCE MASTER PLAN

Having identified the problems of drinking water supply in the State, an attempt is made in this document to delineate a master plan to provide drinking water to all the villages within a reasonable time frame. The following aspects of the approach to a master plan are outlined in the present chapter.

- 3.1 Norms for providing drinking water - its standard and deviation;
- 3.2 Order of priority in tackling the problem villages;
- 3.3 Selection of sources of supply;
- 3.4 Mode of supply i.e. HP, MWS are PWS;
- 3.5 Innovative and non-conventional technologies;
- 3.6 Preparation of project reports;
- 3.7 The delivery systems;
- 3.8 Water Quality monitoring and surveillance;
- 3.9 Sustainability of sources and related issues;
- 3.10 Capital Cost sharing and Operation and Maintenance (O&M);
- 3.11 Financial requirements and sources of funds.

These are discussed in the subsequent paragraphs

3.1 NORMS

3.1.1 Quantity

Since the introduction of the Accelerated Rural Water Supply programme in the Central Sector, the Government of India has prescribed a norm of providing a minimum of 40 lpcd of

Purpose		Quantity (lpcd)
1	Drinking	3
2	Cooking	5
3	Bathing	15
4	Washing Utensils & House	7
5	Ablution	10
Total		40

water supply to meet the basic requirements. These norms have been adopted by most of the States/UTs of the Indian Union including Karnataka. Some States have, however, adopted higher norms for specific projects as in the case of the World Bank aided Integrated Rural Water Supply & Sanitation Project in Karnataka.

The Government of Karnataka has accorded the highest priority to Rural Water Supply since the inception of the Minimum Needs Programme (MNP) under the State Sector and the Accelerated Rural Water Supply Programme (ARWSP) under the Central Sector. Out of 56,682 habitations in Karnataka, 30,165 habitations have schemes with installed capacity for a supply level more than 55 lpcd. Only 5,558 habitations have installed facilities for a supply level less than 20 lpcd (1,146 habitations have facilities for a supply level less than 10 lpcd and 4,412 habitations have facilities for supply between 10 to 20 lpcd).

Habitations Lpcd Categorywise		No of Habitations
1	Less than 10 lpcd	1146
2	10 to 20 lpcd	4412
3	20 to 40 lpcd	12423
4	40 to 55 lpcd	8536
5	More than 55 lpcd	30165
Total		56682

At this stage it is necessary to be clear about the levels of service provided in the villages as mentioned in the above paragraph. Any level of water supply indicated above refers only to the capacity of the water supply works to deliver the service under optimum operating conditions and not to the actual quantities of water supply. Even though a given village may have a water supply scheme capable of delivering 55 LPCD supply, it would be contingent upon power supply for a period of 12 hours during the day time. This is a condition, which is seldom fulfilled in the rural areas, given the shortage of power supply and the low voltage problems due to the weaknesses in the system of power distribution. To the extent that the availability of power supply during day time is

reduced from the assumed pumping time of 12 hours, the level of supply also gets automatically reduced.

The quality of maintenance of the water supply schemes affects the service delivered by them substantially. Poor maintenance results in frequent shut down for repairs to pumps, pipe lines etc., and during such periods the communities receive only a part of the designed level of supply. There are also seasonal variations in the levels of water supply due to the fluctuating water table in the aquifers. Typically, during the summer months the water levels in the borewells are very low due to poor recharge and excessive pumping of water in the vicinity for irrigation purposes. The daily output of water from the borewells thus goes down considerably reducing the level of service available to the communities.

The above facts point to the need for providing for some excess capacity in designing rural water supply schemes and creating adequate stand-by facilities in the form of borewells fitted with handpump, open wells, etc., so that the communities can use such sources when the service provided by the water supply schemes is adversely affected for technical or other reasons.

Another justification for the above approach is the fact that most of the rural areas in Karnataka are dry and drought prone. The open sources of water like ponds and streams are highly seasonal and dry up completely during the summer months. Thus, during the dry periods of the year rural water supply schemes have to cater to the needs of even the live stock population in the villages. The guidelines issued by Government of India explicitly recognize such a contingency in the case of DDP (Desert Development Programme) districts and require that the rural water supply schemes in such areas should be designed for a capacity of 70 LPCD taking into account the water needed for the livestock population in the villages.

Government of Karnataka has traditionally accorded a very high priority for supply of drinking water in the rural areas. The rural communities have thus come to expect a satisfactory and dependable level of service. Further, the State Government recognizes the fact that availability of water in adequate and assured quantities is one of the factors that influence the quality of life in the rural areas through higher levels of sanitation, health and hygienic practices. Thus, higher levels of consumption of water in the rural areas are considered a desirable social objective in the interest of promoting a better quality of life.

The Government of Karnataka not only proposes to adopt the norm of providing at least 55 lpcd water supply but also to achieve the goal of covering all habitations in Karnataka by the year 2005 with this water supply norm. All the partially covered habitations, i.e., habitations with water supply less than 55 lpcd are proposed for upgradation to supply level of at least 55 lpcd. It is also proposed to provide individual house service connections at 70 lpcd in case of piped water supply schemes following a demand responsive approach. The effective supply level for which the schemes are to be designed will be higher than 55 lpcd as worked out below.

Sl No	Stand Post Supply		House Connection Supply		Net Supply lpcd	System losses @ 15%	Gross Supply lpcd
	%	lpcd	%	lpcd			
A	B	C	D	E	F	G	H
	Bx55/100		Dx70/100		C+E	Fx15%	F+G
1	100	55.00	0	0.00	55.00	8.25	63.25
2	90	49.50	10	7.00	56.50	8.475	64.98
3	80	44.00	20	14.00	58.00	8.7	66.70
4	70	38.50	30	21.00	59.50	8.925	68.43
5	60	33.00	40	28.00	61.00	9.15	70.15
6	50	27.50	50	35.00	62.50	9.375	71.88
7	40	22.00	60	42.00	64.00	9.6	73.60
8	30	16.50	70	49.00	65.50	9.825	75.33

In areas where water is chemically contaminated in hard-core villages where sources are not available within a reasonable distance and supply of drinking water is made through the tankers, and in habitations

where non-conventional treatment plants are proposed, a dual water supply policy may be adopted. The supply norm of 10 lpcd of water free from quality problems for drinking and cooking purposes may be adopted. For other purposes, available water from the existing water supply systems may be utilized.

3.1.2 Quality

Water quality issues are gaining recognition as groundwater depletion worsens. The level of natural contaminants such as fluoride and arsenic, and chemical pollutants such as pesticides and insecticides, is high and rising. Water quality concerns clearly have serious implications for the supply of rural water supply and are important determinants of public health. For all rural water supply schemes care should be taken to provide water of quality conforming to the standards prescribed by the Government of India from time to time. ANNEXURE-X shows the drinking water quality standards for physical, chemical as well as bacteriological standards. In case of habitations where water quality is affected, the norms of dual water supply may be adopted.

3.1.3 Distance

In most rural water supply systems, water is provided through stand posts or bore-wells. Individual house connections are also planned in some cases. As per the existing norms, the source of collection of water should be within a horizontal distance of 1.6 kms in plains or 100 mtrs elevation in hilly areas. Since it is now proposed to provide individual house connections in rural water supply schemes, the objective of social justice makes it desirable that the water is made available to other stand-post users also at a reasonable distance and elevation. The State Government thus proposes to adopt the following

distance norms, which were recommended by the conference of Chief Ministers in 1996.

Horizontal distance in Plains – 0.50 Kms

Elevation in hilly region – 50 mtrs.

3.2 ORDER OF PRIORITY OF THE PROBLEM VILLAGES TO BE TACKLED IN THE MASTER PLAN

The instances of wide spread incidence of diseases due to arsenic contamination in West Bengal and Bangladesh and the prevalence of dental skeletal fluorosis in the State of Karnataka, Andhra Pradesh, Tamil Nadu, Gujarat, Rajasthan and other states are glaring examples of the effects of contaminated water on public health. Therefore, while supplying water to problem habitations priority is to be accorded to the chemically contaminated habitations. Among them top priority is to be accorded to the habitations affected with more toxic substances.

In addition, highest priority is to be accorded to provide water to habitations with severe deficit in water supply levels, i.e., habitations with water supply less than 10 lpcd followed by habitations with water supply between 10 to 20 lpcd. Other partially covered habitations shall also be upgraded as per norms.

In general, the following order shall be followed in prioritizing rural habitations for taking up water supply schemes.

Priority 1	Habitations with water supply level less than 10 lpcd
Priority 2	Habitations with water supply level between 10 to 20 lpcd
Priority 3	Quality affected Habitations
Priority 4	Habitations with water supply level between 20 to 40 lpcd

Priority 5	Habitations with water supply level between 40 to 55 lpcd
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3.3 SELECTION OF SOURCE OF SUPPLY

Since the inception of the Rural Water Supply programmes in the State, ground water sources have been predominantly selected as the sources of supply. Over 95% of the Rural Water Supply Schemes are currently based on ground water sources. During last two decades, the ground water table has gone down progressively due to indiscriminate withdrawal of ground water for irrigation, and industrial purposes and inadequate recharge of ground water aquifers. Chemical contamination of ground water has since been observed in high concentration. Because of chemical contamination in many places, the ground water, which was thought to be a good source for drinking water, has become unfit for human consumption in many areas. Under the above circumstances, it will be necessary to look for alternative sources of supply to supplement ground water sources.

In the section on "Water Resources" the subject of availability of drinking water sources has been discussed in detail. The ground water, the river systems, the irrigation systems and the tank systems in the State are the potential sources of Water Supply Schemes. The tank systems, which are silted up today, are potential sources of drinking water supply in a big way. These tanks once renovated need continuous development and monitoring through catchment area and watershed management. The irrigation systems and the river systems are another source of supply. Since drinking water supply is to be given top priority among all uses of water, there should be no difficulty in selecting these as the sources of Water Supply Projects, although at present these are predominantly utilized for irrigation.

Ground Water Sources free from quality problem with adequate recharge measures are still to be preferred in view of the low cost of Operation & Maintenance and low capital costs. However, in areas where ground water sources are severely affected with quality problems or in other problematic areas, surface sources available within a reasonable distance may be preferred. The issue of sustainability and quality of water supplied may result in the communities preferring the surface sources. The costs are to be the guiding factor for selection of sources and designing the schemes.

3.4 MODE OF SUPPLY

In Karnataka, the mode of supply of drinking water to the villages is mainly through Hand Pumps (HPs), Mini Water Supply Schemes (MWSS) and Piped Water Supply Schemes (PWSS).

Hand pumps are provided in the case of villages with a population less than 500 where adequate ground water is available within a reasonable distance of 1.00 Km from the village. Mini Water Supply schemes are provided to villages tapping bore-wells fitted with power pumps. The population of such villages would be between 500 and 1000. Mini Water Supply Schemes are provided with a skeleton distribution system or with a centre point supply through cisterns located at suitable places in the village. For villages with a population of more than 1000, Piped Water Supply Schemes are provided. In these schemes nearby / remote sources are tapped through borewells and water is supplied through a more elaborate distribution system and stand posts. In certain cases, house service connections are also provided.

There are very few cases of Regional Piped Water Supply schemes in the State covering a large group of villages affected with poor water quality and scarcity. However, with the increasing number of water

quality and water scarcity villages, it may be imperative to go in for, Regional Water Supply Schemes tapping remote sources, like tanks irrigation canals or reservoirs. In the proposed Master Plan the concept of Regional Water Supply Schemes is incorporated along with the existing mode of supplies.

In the case of isolated habitations having quality problems, the mode of supply may be a non-conventional system of a water treatment plant. This has not yet been practiced in the State except on an experimental basis.

3.5 INNOVATIVE AND NON-CONVENTIONAL TECHNOLOGIES

With increasing industrial and agricultural activities and continuous discharge of huge quantities of Municipal waste, the ground and surface water are increasingly getting contaminated. Innovative and Non-Conventional Technologies such as Reverse Osmosis / Electro Dialysis and combination of other Membrane Technologies will have to be tried out in the future. It is essential that the State Government adopt the non-conventional technologies at least on a pilot basis so that the Government agencies and Communities can gain experience and knowledge of the latest development of technologies in water treatment. There are remote villages and hamlets where such non-conventional technologies may be of good use since conventional technology may not be adequate to overcome the hazards of contaminated drinking water in such remote villages.

3.6 PREPARATION OF PROJECT REPORT

The implementation of RWS Projects, i.e., design, procurement and construction management of rural water supply schemes is carried out by the Zilla Panchayats. However, planning, technical assistance and monitoring are retained at Circle / State level of the Rural Development

Engineering Department (RDED). The RDED consolidates, reviews and makes recommendations on all water supply programmes and is responsible for providing monitoring and technical support to the ZP Engineering divisions that implement the schemes.

Most engineering problems stem from inadequate data and assumptions regarding the quantity as well as the quality of water sources. Insufficient delegation of powers regarding procurement, tendering procedures, sanctioning of estimates compounds the problem and causes delays in implementation resulting in time and cost overruns. Design and supervision staff at the field level as well as management levels are known to give inadequate importance to quality control, as they are also responsible for other sector civil works of Panchayat raj institutions. The technical officers of RDED and ZP Engineering divisions after do not find time to carry out detailed survey that is necessary for a Piped Water Supply Scheme for a cluster of villages.

Rural Development Engineering Department (RDED) and the Z.P. Engineering Divisions need to be strengthened and trained in modern methods of design, quality control and preparation of project reports. Adequate delegation of powers within the implementation machinery needs consideration. Private Sector Consultancies and Technical Education Institutions are also to be encouraged to work with Govt. agencies for preparation of project reports, surveys and investigation, project design and physical implementation. These agencies are to act as technical assistance partners to Zilla Panchayaths and Gram Panchayats who are to assume the responsibility of Water Supply Management.

3.7 THE DELIVERY SYSTEM

The current emphasis on targets and norms encourages excessive investment, undermines efficiency and deters the transfer of ownership to the institutions responsible for operations and maintenance. Government domination of the sector services has limited the potential scope for participation by non-government organizations, private sector partners and most important of all the user community. The experiments in externally aided projects under implementation in Karnataka have been encouraging in regards to increasing the levels of community participation and Panchayat raj institutions in the execution and in the operation and maintenance of water supply schemes.

Decentralisation is viewed as an opportunity to provide more responsive planning and delivery of services. Panchayat raj institutions can accommodate local aspirations and needs better. As such the Gram Panchayats (G.Ps) at the lowest level of government and together with local communities should have a role locating the facilities, choosing technologies and monitoring payments. Ownership and management must be community based and as free as possible from bureaucracy and politicization.

The Master Plan proposes to promote and facilitate participation of the NGOs and the private sector in management of water supply schemes. The NGOs and private sector agencies can provide alternatives to the public provision of services.

3.8 WATER QUALITY, MONITORING AND SURVEILLANCE

With the launching of the National Drinking Water Mission by the Government of India, a Submission on Water Quality Monitoring and Surveillance was established in 1986. Since then Water Quality Monitoring has become an integral part of drinking water supply programme.

In the Master Plan, it is proposed to make all the laboratories functional within a year because Water Quality Analysis is a prerequisite for identification of Quality Affected Habitations. The State Government is committed to cover all NSS (Not Safe Source) category villages within one year. It may be mentioned here that many villages, which are supplied with chemically contaminated water do belong to NSS (not Safe Source) habitations and deserve safe drinking water on top priority. As a prerequisite to achieving this goal, the establishment of laboratories deserves immediate attention.

It has been observed that a large number of ground water sources are affected with chemical contamination. Analysis of these sources is carried out for 14 parameters as prescribed by the Government of India. ANNEXURE-X shows these parameters with respective permissible limits and the limit for "Cause for Rejection".

As per the data maintained by the Department of Mines and Geology, drinking water sources in rural areas of 69 taluks spread over 18 districts of the State are chemically contaminated. (The list of taluks is furnished vide ANNEXURE-XI).

It may be observed here that the problems of Fluoride, Total Dissolved Solids and Nitrate are widespread in the State. The problem of fluoride in drinking water, which is prevalent in arid and semi-arid regions of the State has posed a threat to Public health and is a serious cause for concern. Presence of iron and hardness are also observed in many areas.

Testing of drinking water samples in rural areas has been undertaken by the Rural Development Engineering Department (RDED), on a massive scale in all the taluks of the State and the work is in progress. So far, testing of samples has been completed for 37,776 sources in 45 taluks. As per the test reports, 15,025 sources in 5,008

habitations are affected with quality problems. This goes to show that due to over exploitation of ground water and depletion of water table, concentration of chemicals has increased causing contamination.

On the basis of the above representative water quality analysis reports, it is estimated that out of the total 56,682 habitations, about 10,277 habitations may have quality problems in drinking water. The partially covered (PC) habitations out of these 10,277 shall be tackled while upgrading the facilities. The fully covered (FC) habitations affected with quality problems are estimated to be 5,810. To provide safe drinking water to these PC and FC habitations, through distant borewell sources / surface sources / treatment plants / artificial recharge measures the total amount required would be approximately Rs.1,150 Crores.

3.9 SUSTAINABILITY OF SOURCES AND RELATED ISSUES

Sustainability of sources has posed a major problem ever since the water table have been observed to fall sharply in many taluks due to excess and indiscriminate withdrawal of ground water. Depletion of water table has resulted in either the non-functioning of large number of tube wells or very low yields. Excess withdrawal has also been considered responsible for geochemical changes resulting in wide spread chemical contamination of ground water not observed in the past.

Capacity of surface sources like rivers, lakes, reservoirs and tanks have also come to the lowest due to destabilisation of their catchment areas on account of deforestation and associated human activities and siltation.

However, contrary to the general belief, there has been no appreciable change in normal and average rainfall in any region or district of the State. ANNEXURE-XII substantiates this statement. Thus, rainfall remaining the same, there has been a general neglect in the

conservation of the precipitation received. Due to lack of conservation, a major part of the rainfall goes waste by way of evaporation and run-off to the sea. Only a small part is recharged to replenish ground water and stored in tanks, lakes etc., as surface water. Therefore a conscious decision has to be taken to resort to artificial conservation measures for ensuring sustainability of sources.

The following measures are suggested to be taken up in the Master Plan period as medium and long-term measures:

- ♦ To regulate indiscriminate ground water withdrawal by enacting appropriate legislation;
- ♦ To protect resources against quality degradation;
- ♦ To adopt appropriate measures for augmenting recharge of ground water aquifers;
- ♦ To resort to watershed development programmes aimed at soil and water conservation by arresting the run-off;
- ♦ To resort to desiltation of the tank and reservoir systems of the State and catchment area development through micro-watershed Management;
- ♦ To resort to afforestation of deforested areas;
- ♦ To conserve water through Rain Water Harvesting wherever possible.

In the light of the above, it is recommended to adopt a "Sub-Mission approach for Sustainability of Sources and Systems". A provision of a maximum of 20% of annual budget of R.W.S. should be earmarked for the above purpose. The amount may be utilized to protect and recharge ground water sources of water supply systems. Restoration of water bodies and recharge of ground water in general shall be the objective to be promoted by Government through departments like Minor

Irrigation, Watershed Development etc., and not under water supply programmes directly.

3.10 CAPITAL COST SHARING AND OPERATIONS AND MAINTENANCE

Sustainability and Operation & Maintenance of water supply systems are as important as the creation of systems. Insufficient attention to O&M of the systems as well as the sustainability has resulted in non-functioning of a large number of systems. The economic and environmental benefits of sustainability and proper O&M of the systems have in the past been overshadowed by the enthusiasm of extensive coverage of habitations. The traditional approach of centralized planning and prescription, reliance on government for capital and recurring cost of O&M, which were central to supply-driven approach, requires reconsideration while following a demand responsive approach in the coming years.

Since the introduction of Panchayat Raj in Karnataka, operation of water supply schemes have been the responsibility of Gram Panchayats. The Zilla Panchayats were responsible for maintenance of the schemes. The Karnataka Panchayat Raj Act 1993 provides that the O&M of rural water supply schemes is one of the statutory responsibilities of Gram Panchayats. However, the responsibility in this context was poorly defined.

Despite the complexity in institutional arrangements, operations & maintenance arrangements can generally be categorized by the type of technology, viz, handpumps, MWSS and PWSS. Maintenance of MWSS and PWSS not only involve payment of wages to personnel deployed for operation of water supply schemes but also payment of electricity charges, maintenance of power pumps and distribution systems and attending to minor repairs. Maintenance of handpumps, though appears

to be simple, depends upon the availability of trained manpower and service providers. Maintenance of water supply schemes at ZP level resulted in inadequate attention to sustainability thereby reducing the life of the water supply systems.

In order to create a sense of ownership of the assets created by the Government for water supply in rural areas and to make the grass root level Panchayat Raj Institutions and the user communities responsible for O&M, the Government of Karnataka has now transferred O&M of all Mini Water Supply schemes and Piped Water Supply schemes to the Gram Panchayats. At present the government continues to partially share the O&M cost of these schemes. However the government proposes to gradually withdraw such partial cost sharing making the GPs responsible for meeting 100% O&M cost by collecting user charges through VWSCs.

The Government of Karnataka has also transferred the maintenance of all handpumps to TPs. This has been retained with TPs to ensure economies of scale in maintenance and because of the fact that the trained manpower and service providers are not otherwise available in the market for the GPs.

While creating new schemes community participation is envisaged by not only empowering them in the decision making process but also by motivating them to contribute towards the capital cost of the schemes. Provision of water supply services has an economic value also to the society and private users in addition to being a socially desirable objective. Continued subsidization of the services by the government distorts the signals to the users of the scarcity value of water. It also undermines any efforts to promote a more efficient and sustainable use of water. It is therefore proposed to introduce and implement a capital cost sharing policy to ensure that Panchayat Raj Institution and communities are partners to make capital investment and transfer of

ownership more efficient. A predefined capital cost formula will drive investments and encourage affordable investment profiles with more realistic user expectations.

In Karnataka, the experience in capital cost sharing by the user communities has been encouraging though the demand generation has been slow. While there was no capital cost sharing in some of the early projects where only operation and maintenance of the schemes were entrusted to the user communities, later in the World Bank assisted IRWS & ES Project, there was a 30% capital cost contribution towards sanitation facilities which accounted for 7% of the project cost. Similarly in the DANIDA assisted project under implementation a 5% capital cost sharing formula has been followed. The government proposes to continue with the experiment in externally aided projects and GOI sector reforms projects. After evaluating the impact of such cost sharing on the sustainability of water supply schemes in terms of the predefined goals and objectives, the government will consider applying the policy of such capital cost sharing to the sector of rural water supply in Karnataka throughout the State.

3.11 FINANCIAL REQUIREMENTS AND SOURCE OF FUNDS

The financial requirements of the sector as per the stated goals and objectives have been worked out to be approximately Rs 2,650 crores. It is expected to meet these requirements within the Master Plan period by the year 2005 from State sector MNP, Central Sector ARWSP, external aid for projects in the sector, GOI sector reforms project and sub-mission projects and capital cost sharing by user communities and Gram Panchayats. The state allocation may be increased to the desired level to achieve the goals and objectives of the sector.

CHAPTER - IV

THE MASTER PLAN 2000-2005

4.0 COVERAGE:

The Government of Karnataka has adopted a policy of providing at least 55 lpcd of water supply in the rural areas of Karnataka. All Partially Covered Habitations (PCHs), i.e., habitations with present water supply level less than 55 lpcd are to be upgraded to the supply level of at least 55 lpcd by the year 2005. Further all Partially Covered Habitations as well as Fully Covered Habitations (FCHs) are to be provided with water free from quality problems adopting norms of water quality prescribed by Government of India by the year 2005. Water is to be made available within a distance of 1/2 km from habitations in plains and 50 meters elevation in hilly areas.

4.1 ORDER OF PRIORITY:

A judicious mix of Demand Responsive Approach instead of Supply Driven Approach with due regard to the obligatory functions of Government is proposed to determine the priority. Habitations with severe deficit in water supply level as well as the habitations facing acute quality problem shall be accorded highest priority. The remaining habitations are proposed to be covered as per norms following a Demand Responsive Approach so as to achieve the goal of coverage by the year 2005 for all habitations.

4.2 SELECTION OF SOURCES:

Ground Water Sources free from quality problems with adequate recharge measures are to be given highest preference as sources for rural

water supply schemes, as they are less expensive and are easier for Operation & Maintenance. Surface sources, wherever available are to be considered particularly in areas where ground water sources are severely affected with quality problems. Problematic hard-core areas may be covered with multi-village schemes. The per capita capital cost and the O&M cost are to be the guiding factors in the selection of sources and in designing schemes. A community preference approach is proposed to be followed within the above framework.

4.3 MODE OF WATER SUPPLY:

The following modes of water supply are to be followed as the norms for rural water supply schemes:-

1	Habitation with Population less than 500 in plains and less than 350 in hilly areas	Bore Wells with Hand Pumps (BW with HPs) One BW per 100 Population
2	Habitation with Population more than 500 and less than 1000 in plains and more than 350 and less than 700 in hilly areas	Mini Water Supply Scheme (MWSS).
3	Habitation with Population more than 1000 in plains and more than 700 in hilly areas	Piped Water Supply Scheme (PWSS) with provision of individual house service connection.

Selection of the type of scheme shall be done based on the present population, whereas population 2021 is to be considered while designing the capacity of the Piped Water Supply Schemes.

4.4 INNOVATIVE AND NON-CONVENTIONAL TECHNOLOGIES:

Innovative and Non-Conventional Technologies are to be promoted with IEC campaign to ensure community awareness, particularly in hard-core problematic villages.

4.5 PREPARATION OF THE PROJECT REPORT:

Rural Development Engineering Department (RDED) and the Zilla Panchayath Engineering Divisions are to be strengthened and trained in modern methods of design, quality control and preparation of project reports. Private Sector Consultancies, Technical Education Institutions are also to be encouraged. These agencies are to act as technical assistance partners to Zilla Panchayaths in the construction of water supply schemes and to Gram Panchayats who are to assume the responsibility of Water Supply Management.

4.6 THE DELIVERY SYSTEM:

The State Government will promote and facilitate participation of the NGOs and the private sector and to enable Panchayat Raj Institutions and the user community groups to assume the lead in decision-making. Gram Panchayats (GPs) shall be the nodal agencies for Water supply management. The actual construction of water supply schemes shall be carried out through private sector contractors or through Government agencies like KLAC under the supervision of the Zilla Panchayath Engineering Division and the RDED. The GPs and the village water supply and sanitation communities shall be associated in planning and executing the water supply schemes.

4.7 WATER QUALITY MONITORING AND SURVEILLANCE:

All district level laboratories are to be strengthened and made functional for monitoring the water quality. All sources of water supply are proposed to be tested for quality twice a year.

4.8 SUSTAINABILITY OF SOURCES:

Ground Water Recharge measures shall be adopted near all ground water sources of Piped and Mini water supply schemes as part of water supply projects. Up to 20 % of funds for the water supply sector shall be allocated for such measures in the case of existing Piped and Mini Water Supply schemes.

4.9 CAPITAL COST SHARING AND OPERATION AND MAINTENANCE (O & M):

The GPs are responsible for O & M of all water supply schemes except borewells with handpumps. The handpumps are maintained by Taluk Panchayats (TPs) to ensure economies of scale. Moreover trained manpower and services for maintenance of borewells with handpumps are not available in market. The responsibility for maintenance of handpumps may be transferred to Gram Panchayaths after building up the required technical skills and financial capability at the village level.

The impact of experiments in externally aided project districts shall be observed and evaluated in terms of capabilities of VWSCs and GPs for the first three years of the Master Plan. The reform process of O&M by GPs through VWSCs by meeting 100 % O&M cost shall then be extended with necessary modifications, if any, to the entire state by the end of Master Plan period (2005). VWSCs shall be constituted for all scheme villages. The technical capability of GPs shall be enhanced to meet the challenge. User charges shall be collected to meet 100% O&M cost. The reform process is to be allowed a consolidation period of another three years and by the end of the year 2008, all villages in Karnataka are proposed to Operate and Maintain Water Supply Schemes by themselves meeting 100 % O&M cost. GPs through VWSCs shall be responsible for collecting user charges. Capital Cost sharing by the user community up

to 10% shall be compulsory for water supply schemes taken up under all externally aided projects as well as GOI Sector Reforms Projects. The impact of experiments of partial capital cost sharing shall be observed and evaluated in terms of affordability and acceptability of the user communities (VWSCs and GPs) for two to three years to consider extension of this norm of cost sharing with necessary modifications, if any, to the entire state. The objectives shall be to introduce the concept in all villages gradually by the end of 2005. The policy of capital cost sharing shall, however be applicable only in case of Piped Water Supply Schemes and Mini Water Supply schemes taken up along with Piped Water Supply Schemes. The Government considers it obligatory to provide water to smaller habitations through BWs with HPs and MWS. As generally weaker sections of the society inhabit such habitations, it is not socially desirable to deprive them of minimum needs by strictly following the Demand Responsive Approach.

The Master Plan, therefore, proposes the goals of policy reforms in capital cost sharing and O & M as follows:

Scheme Type		Capital Cost Sharing	O & M
1	Habitations only with BWs with HPs (Population < 500)	Nil	By Taluka Panchayats (TPs)
2	Habitations only with MWSS (Population below 1000)	Nil	By GPs through VWSCs meeting 100% O&M costs
3	PWSS/PWSS with MWSS/PWSS with BWS with HPs	10 % of capital cost to be contributed by the user community	By GPs through VWSCs meeting 100% O&M costs

4.10 FINANCIAL REQUIREMENTS:

In order to achieve the goal of providing 55 LPCD water supply in all villages and other objectives set out in para -1 above by the year 2005, the requirement of funds is worked out as follows:

Item Category		Amount Required (Rs in million)
1	Upgrading all Partially Covered Habitations to a minimum of 55 lpcd supply level	14819.00
2	Providing water as per norms to all Quality affected Fully Covered Habitations	11620.76
Total		26439.76

The Govt of Karnataka proposes to meet the cost in a five year Master Plan period as follows:

Item Category		Amount Required (Rs in million)
1	State (MNP) and Central (ARWS) Sector grants (Rs 2240 million per year)	12000
2	WB assistance for the follow-on project	10000
3	GOI Sector Reforms Projects	2000
4	Other Externally Aided Project (DANIDA, etc)	1000
5	Capital Cost sharing by the user community	1500
Total		26500

User community contribution @ 10 % capital cost is considered only for item no 2, 3 & 5. Additional user community contribution at the end of Master Plan period when the sector reforms agenda is extended to entire state is expected to meet the costs of additional requirements / shortfalls, if any

At the end of the Master Plan Period, it is expected that the norms of coverage and quality of water supply shall be achieved by adopting a demand responsive approach together with partial capital cost sharing and 100 % O & M cost financing by user community. The Panchyat Raj Institutions in Karnataka provide a politically, legally and institutionally supportive environment to facilitate the implementation of the reform process. The emphasis on devolution of responsibilities to grass roots level shall result in the sustainable management of community based water supply systems in the rural areas.

CHAPTER – V

PROGRAMMES FOR RURAL SANITATION IN KARNATAKA

5.0 INTRODUCTION

Improved sanitation is considered as an essential requirement for socio-economic development and an important factor in upgrading the quality of life. Sanitation is critical to Health and Well being which are an index of Human Development. However, while the importance of providing potable water supply in the rural areas through State initiatives was recognised very early in the development strategy, promotion of rural sanitation as a significant component of the strategy for rural development is a relatively recent phenomenon in the State of Karnataka and in India. Even today, the direct budgetary allocations for rural sanitation both at the Central and the State level represent a comparatively small proportion of the allocations for rural development programmes. Also, the preventive health programmes do not incorporate promotion of sanitation as an important component of their strategy. The low priority accorded to rural sanitation in the strategy for rural development is perhaps the result of a combination of factors like the non-availability of resources on a sufficiently large scale to make a visible impact in the sector, and the perceived need to use the available resources for investment in more directly 'productive' activities. Another reason for the neglect of this sector was perhaps the lack of effective articulation of the demand for sanitation facilities by people in the villages.

Early initiatives in the field of rural sanitation focussed mainly on two aspects i.e., construction of sullage and storm water drains and provision of community toilets. Both these activities were attempted mainly by the local government institutions like the Village Panchayaths

or Taluk Development Boards/Taluk Panchayaths. The limited finances available with these institutions meant that their efforts remained sporadic and often did not go beyond the provision of the most rudimentary open sullage drains built along the 'more important' streets in a village without the assurance of such drains leading off the sullage outside the village. The community latrines built, mainly intended to provide privacy to women, who could not use the open fields as toilets during day time, were rendered useless almost everywhere, mainly due to the absence of a system of maintenance. Absence of running water in the villages also discouraged people from having latrines at the household level except in the case of a small minority of households who could build dry pit latrines for their use in their spacious homesteads or backyards. Thus, access to sanitary latrines remained at a very low level in Rural Karnataka with only 6.9% households in the villages having the facility according to 1991 Census.

5.1 CENTRAL RURAL SANITATION PROGRAMME

The Central Rural Sanitation Programme (CRSP) started by the Ministry of Rural Development, Government of India in 1985-86 provided an opportunity to address the issue of rural sanitation in a systematic manner. The emphasis of the programme was mainly on construction of sanitary latrines, mainly of the twin pit pour flush (TPPF) type advocated by the UNICEF, at the household level. The guidelines for CRSP made provision for dissemination of technology for construction of rural latrines and for generating awareness of the importance of sanitation in the rural areas through IEC activities. Upto 80 per cent of the cost of a sanitary latrine was given as subsidy to households below the poverty line (BPL). Similar grants were available to local bodies for construction of community latrines, particularly for women. Opening of Rural Sanitary Marts to disseminate technology and to act as 'one stop shops'

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for supplying various materials for household sanitation was another novel initiative under the CRSP. An important feature of CRSP was that it tried to involve rural households in the construction of sanitary latrines for their use instead of public agencies doing the construction. This made it possible for latrines being built with local materials and at a very low cost. In Karnataka, the Zilla Parishads and Mandal/Grama Panchayaths made very significant efforts to implement CRSP, particularly in villages where water supply position was somewhat more comfortable. The UNICEF provided both financial assistance and technical guidance in implementing the programme.

While the CRSP succeeded in making the Panchayaths focus on latrine sanitation as felt need of the people, it could not make a major impact in the State due to certain limitations. The allocations from the Centre were very small compared to the need for construction of latrines. Further, the subsidy for household latrines was available only to the BPL households, for whom latrine sanitation was not always a priority. The economically weaker sections in the rural areas often lacked the space required for construction of a TPPF latrine next to their dwelling houses. Moreover, the poorer households who were seen as the target group (for subsidies) under the CRSP could not be expected to change their habits in favour of using sanitary latrines when the rest of the Village Community were still using open fields as toilets. Thus, the CRSP resulted in creating only a limited impact in the field of latrine sanitation, with only 1.19 lakh households being assisted under the programme from 1985-86 to 1994-95.

5.2 NIRMALA GRAMA YOJANA

An attempt to address the limitations of the CRSP in the State was first made by the Zilla Parishad, Mysore, in 1987. The ZP formulated a

new scheme called the Nirmala Grama Yojana under which a subsidy of Rs.500/- per household latrine was made available to any rural household willing to construct a TPPF latrine for its use irrespective of whether the household was in the BPL category or not. Further, the Village Level Panchayaths (the then Mandal Panchayaths) were given the responsibility to build at least one hundred toilets each per year, with the target of over 16,000 toilets in Mysore district alone for the 165 Mandal Panchayaths. The actual performance usually exceeded 10,000 toilets per year which was still a quantum jump from the earlier figures of about one thousand per year in the district.

The Nirmala Grama Yojana (NGY) model of Mysore district was adopted at the state level in 1995-96 with the launch of the State's NGY on 2nd October 1995. Under the NGY, the Grama Panchayaths were given the responsibility of motivating rural households to build TPPF latrines which are economical in their requirement of water for flushing. Each Grama Panchayaths was encouraged to motivate about one hundred households a year which should result in construction of over 5 lakh toilets per year with over 5600 Grama Panchayaths functioning in the State. A cash subsidy of Rs.2000/- per household is given to BPL households with non-BPL households being given Rs.1200/- The programme lays greater emphasis on IEC activities, and also provides for community latrines and institutional latrines in the villages. The guidelines of the programme also advocate an integrated approach to sanitation, including construction of sullage and storm water drains and removal of manure pits from the vicinity of dwelling houses in the villages. However, no specific cost norms and separate financial allocations were given for components of rural sanitation other than construction of community and household sanitary latrines of the TPPF type.

The launch of the NGY at the State level has proved a spectacular breakthrough for rural sanitation in the State. While the IEC campaign associated with the NGY increased people's awareness about the need for building latrines, the subsidy/incentive provided under the programme has drawn a great deal of response from the rural households. Eventhough the target of building 5.00 lakh latrines per year has not reached (the programme budget was not adequate for the target), the average performance of building over 1.50 lakh household latrines per year has exceeded the previous CRSP performance by six to eight times. The performance of the State in the construction of sanitary latrines during the last six years is shown in the following table:

Progress Under Nirmala Grama Yojana

Year	Financial (Rs. In Lakhs)		Physical (Nos.)	
	Target	Achievement	Target	Achievement
1994-95	1512.00	494.45	10903	25886
1995-96	4204.73	2180.23	252208	132140
1996-97	4150.35	2248.87	282050	163597
1997-98	4431.53	2026.57	278005	149056
1998-99	3600.00	2298.59	225824	155148
1999-2K	2884.94	1942.00	154500	127637

Apart from the NGY, construction of substantial numbers of household level latrines in the rural areas is undertaken as part of the Integrated Rural Water Supply and Environmental Sanitation project funded by the World Bank which is being implemented in sixteen districts of the state. Nearly 89000 latrines have been built under this project since 1993 and till August 2000. Smaller numbers of household

latrines have been built as part of the Netherlands Aided Rural Water Supply and Sanitation Project (1730 latrines) implemented in five districts and the DANIDA Assisted Rural Drinking Water Supply and Sanitation Project (5719 latrines) in four districts. These three projects have succeeded in enabling the State Government and the Panchayaths to appreciate the need for adopting an integrated approach to rural water supply and sanitation and involving the user households in the construction and maintenance of these facilities for their long term sustainability.

5.3 SCHOOL SANITATION PROGRAMME

Another major initiative which is associated with Mysore district is the successful implementation of a School Sanitation Programme by the Zilla Panchayath with the assistance of the UNICEF. Recognising the importance of inculcating appropriate sanitation practices among school children, the Zilla Panchayath has taken up a campaign to provide water supply and latrine sanitation facilities to all primary schools in the district. The schools are also assisted in the construction of compound walls to enable children to maintain the school premises clean and neat. Novel strategies are adopted under the campaign to sustain the motivation of the school children and the teachers at a high level. So far 277 primary schools in the taluks of Mysore, Hunsur & Periapatna the district with a student population of about 43,000 have been covered under the campaign and new areas are being added for coverage every year. The Mysore experiment is being replicated with the State Government and the UNICEF launching a school sanitation campaign in three other districts i.e., Tumkur, Chitradurga and Raichur. The State Government is also considering the extension of the programme to all the districts in the State, keeping in view the recommendations of the Task Force on Primary Education.

5.4 LEGISLATIVE MEASURES TO PROMOTE RURAL SANITATION

The Karnataka Panchayath Raj Act, 1993 lists "maintenance of general sanitation, cleaning of public roads, drains, tanks, wells and other public places, and constructions and maintenance of public latrines" among the functions of the Grama Panchayaths (Section 58 and Schedule I entry XVIII) "Implementation of Rural Sanitation Schemes" and "Promotion of drinking water and rural sanitation programmes" are also listed among the functions of Taluk and Zilla Panchayaths respectively. (Schedule II entry IX and Schedule III entry X). Keeping in view the good response to the Nirmala Grama Yojana started in 1995, and the need for involving elected Panchayaths in the task of promoting rural sanitation, the State Legislature amended the Karnataka Panchayath Raj Act in 1997 to make it mandatory for every elected Member of a Panchayath to provide a sanitary latrine for the use of his/her household. Those who did not provide the facility could suffer disqualification from their Membership of the Panchayath. Further, having a sanitary latrine at home is also made a mandatory requirement for contesting panchayath elections in the State. These widely debated, and contested, legislative changes have resulted in increasing the level of awareness among the elected Members of Panchayaths about the need for promoting rural sanitation, and about their own responsibility in this regard. It is estimated that over 45,000 elected members undertook the construction of sanitary latrines with assistance from Government after the above legislative changes came into force. The 1997 amendments have also enlarged the role of the Grama Panchayaths and Taluk Panchayaths in rural sanitation to identify the following among their "mandatory" functions:-

Grama Panchayaths:

- (a) providing sanitary latrines to not less than ten per cent of the households every year and achieve full coverage as early as possible;
- (b) constructing adequate number of community latrines for the use of men and women, and maintaining them;
- (c) providing sanitation and proper drainage; and
- (d) earmarking places away from the dwelling houses for dumping refuse and manure (Section 58, Karnataka Panchayath Raj Act, 1993).

Taluk Panchayaths:

- (a) construction of individual and community sanitary latrines;
- (b) providing adequate number of class rooms and maintaining primary school buildings in proper condition with water supply and sanitation; and
- (c) acquiring land for locating manure pits away from dwelling houses in the villages (Section 145 of Karnataka Panchayath Raj Act, 1993).

5.5 IMPROVED CHULHAS AND BIOGAS PLANTS

Apart from the Rural Water Supply Programme two other programmes of the Department of Rural Development and Panchayath Raj which make a direct contribution to improving rural sanitation are the programme for promotion of improved household level cookstoves (chulhas) and the programmes for Biogas Development. Both the programmes are funded partly by the Central Government and partly by the State. The responsibility for implementation at the field level is mainly with the Zilla Panchayaths, and, in the case of biogas development, partly with the Khadi and Village Industries Commission.

5.5.1 National Programme For Improved Chulhas (NPIC)

Indigenously developed improved Chulhas, having a higher thermal efficiency of 20-30% compared to 6-8% in traditional ones, have

a great deal of potential to conserve firewood, thereby saving forests. Besides, these Chulhas eliminate indoor air pollution, resulting in improved health of women and children. The improved chulha is estimated to save about 300 kg of fuel wood per year. Thus, an improved chulha is a boon to rural women both in terms of providing a smokeless kitchen environment and in reducing the drudgery involved in collection of fuel wood or in the preparation of cow dung cakes.

The National Programme on Improved Chulhas has been in operation in Karnataka since 1983-84. Under this scheme, the beneficiaries are provided training for the construction of improved stoves and are also extended subsidy by the Government for the materials used for construction. The prevailing subsidy rates (1999-2000) are Rs. 63/- per unit for a fixed type of chulha with a chimney and Rs. 73/- for a portable (metal) chulha without a chimney. The progress achieved in the installation of household chulhas during the last five years is shown below:

5.5.2 Progress Under Smokeless Chulha Programme

Year	Financial (Rs. In lakhs)			Physical (Nos.)		
	Target	Achievement	%	Target	Achievement	%
1994-95	157.50	106.87	68	175000	118282	68
1995-96	154.00	113.43	74	150000	111295	74
1996-97	112.00	93.98	84	85000	67588	80
1997-98	80.00	65.97	82	88000	88953	101
1998-99	80.00	51.00	64	40000	52668	132
1999-2K	46.38	23.24	50	65000	54707	84

5.5.3 National Project on Biogas Development (NPBD)

Biogas is a clean, non-polluting, smoke and soot-free fuel, containing inflammable methane gas. It is produced from cattle dung, human waste and other organic matter in a biogas plant, through a process called "anaerobic digestion". The Indian biogas system mainly comprises of collection and processing of cattle dung, production and delivery of biogas and handling & application of digested slurry in agricultural fields.

The Government of India have identified the National Programme for Biogas Development as one of the components of the 20-point programme. The scheme is in operation since 1982-83.

5.5.4 Objectives of NPBD

- To provide easy and safe cooking gas for the rural families;
- To prevent pollution and forest degradation;
- To protect the health of women and children by creating a Smoke-free kitchen;
- To help rural women devote this saving in time to more productive pursuits;
- To utilise the manure procured from the biogas plants for agricultural purposes;
- To create additional employment in the construction of biogas plants;
- In the ultimate analysis, to create a clean, healthy and enterprising village.

Recognising the significance and the numerous benefits of this scheme, the State Government introduced its own Biogas Promotion Scheme in 1992-93 called "Anila Yojane". Under this scheme, the State

extends financial aid for setting up biogas plants, which is in addition to the subsidy provided by the Central Government.

Keeping in view the cattle population in the State, the estimated potential in the State is adequate to sustain about 6.80 lakh biogas plants. Out of this, 2.45 lakh biogas plants have so far been constructed up to the end of 1999-2000. The progress achieved during the last five years is shown below:-

5.5.5. Progress under National Project on Biogas Development

Year	Financial (Rs. In lakhs)			Physical (Nos)		
	Target	Achievement	%	Target	Achievement	%
1995-96	1113.00	1946.21	106	22500	21821	97
1996-97	1141.10	1497.60	131	22000	26439	120
1997-98	994.00	1030.53	104	25000	20005	142
1998-99	754.00	946.13	125	14500	20642	142
1999-2K	740.00	1292.15	175	16000	17832	111

The State has won several awards and prizes from the Central Government for its performance in promoting the construction of biogas plants in the rural areas. In particular, Belgaum District has continuously got national awards for five consecutive years from 1992-93 to 1996-97.

5.6 RURAL SANITATION UNDER EMPLOYMENT GENERATION PROGRAMMES:

Significant investments are being made by the Grama Panchayats and other local Government institutions to take up construction of sullage and storm water drains in the villages. The Grama Panchayats

also take up asphaltting or stone paving of internal roads in the villages in their jurisdiction. Typically funding for these works is made out of the allocations available to the Grama Panchayats under the Jawahar Rozgar Yojana (Now renamed as the Jawahar Grama Samruddhi Yojana). Another source of funding for these works is the allocations made by the State Government out of the grants transferred from the Central Government under the award of the Tenth Finance Commission. There are also instances of the Grama Panchayats raising resources through taxation and collection of development charges to take up paving of roads and construction of drains.

The Grama Panchayats in the State have been receiving nearly Rs.100 crores per year on the average during the last five years as allocations under the Jawahar Rozgar Yojana (JRY). The entire allocation under this programme which is funded in the ratio of 75:25 between the Central and the State Government is passed on to the 5673 Grama Panchayats through the Zilla Panchayats. The average allocation per Grama Panchayat works out to about Rs.2.00 lakhs with the panchayats having larger populations of Scheduled Castes and Scheduled Tribes receiving higher allocations. It is seen that a good part of this amount is spent on construction of drains and formation of roads. However, with the allocation under the programme being very small and even this small amount being distributed among all the habitations/Members' constituencies, the size of works taken up is usually very small and their impact on the environmental sanitation in any given village is often marginal. The amount of expenditure incurred on paving of roads and construction of drains under JRY / JGSY during the last five years is shown below:

Under the award of the Tenth Finance Commission the state has been receiving Rs.54.40 crores per year during the years 1995-96 to 1999-2000 as grants in aid of the state to facilitate strengthening of the

panchayat raj system. This works out to about Rs.17.08 per capita (for GPs Rs.12 per capita & for Taluk Panchayats Rs.3.00 per capita, for Zilla Panchayats Rs.2.08 per capita totalling to Rs.17.08 per capita) of the rural population in the state. According to a decision taken by the State Government Rs.12 per capita per annum out of the above grants is given as the share of the Grama Panchayats. This amount is to be spent as a pooled development fund combining it with the resources contributed by the Grama Panchayats in the ratio of Rs.50 for every Rs.100 received as grants. The State Government has stipulated that the Grama Panchayats must utilise these funds mainly for taking up works relating to Water Supply and Sanitation.

CHAPTER-VI

AN APPROACH TO TOTAL VILLAGE SANITATION

6.0. Background

Poor sanitation is one of the most visible signs of backwardness of our villages. In most parts of the country, and in Karnataka, wherever villages consist of clusters of dwelling houses (as distinct from habitations with scattered houses in hilly areas) it is common to see heaps of cow dung and garbage, pools and ditches with sullage and stagnant water and sometimes-human excreta.

Most of the villages have no paving for the streets, which makes them dusty during the dry season and slushy during the monsoons. The interiors of the dwelling houses often present an unclean look on account of the use of traditional cook stoves which emit a great deal of smoke. Thus there are several aspects, which need to be addressed carefully to promote integrated sanitation in the villages. The main problems to be addressed in this regard would include the safe disposal of human excreta, sullage and storm water drainage, removal of manure heaps from the vicinity of dwelling houses, paving of internal roads and streets and providing improved chullas to enable rural households to do their cooking in a smokefree atmosphere. Such an integrated approach to rural sanitation has so far not been attempted in the State to bring about a transformation in the physical environment of the villages.

6.1 THE PANCHASUTRAS OF RURAL SANITATION

In order to improve the environmental sanitation of the villages in Karnataka, it is now proposed to adopt an integrated approach of Total Sanitation for clean villages (Swachha Grama) consisting of five

important elements – “Pancha Sutras”. The five elements of integrated village sanitation strategy would include the following:

- 1) Paving of internal roads and streets in the village;
- 2) Construction of efficient sullage and storm water drainage;
- 3) Provision of community compost yards and removal of manure pits from the dwelling areas of the village;
- 4) Provision of smokeless chullas / bio-gas for all households;
- 5) Construction of household latrines / group latrines with individual ownership, community latrine complexes, and institutional latrines in schools.

6.1.1 Paving of internal roads and streets:

Most villages in Karnataka which are located in the plains consist of thick cluster of dwelling houses with a network of internal roads and streets / lanes. These streets / lanes are usually very narrow with adequate space only for the movement of bullock carts and cattle. Most of these streets are unpaved and do not also have any surface treatment like macadamising. Even though the surface of these streets / lanes may be compacted by constant use they tend to become very dusty during the dry months and slushy during the monsoons. Most villagers walk barefoot on such roads, which makes it difficult for them to keep their feet reasonably clean.

Promoting environmental sanitation in the villages would therefore warrant provision of paving either by asphaltting or by embedding stone slabs to make the roads free from excessive dust and slush. This should be done as per the requirements and keeping in view the locally available materials in consultation with the village community. The community involvement will ensure maintenance of the facilities in a sustainable

manner. If clean surfaces are provided for all the lanes and by-lanes with finishes which are easily maintainable, it is likely to motivate the villagers to keep the entire village clean. In order to ensue this, it is proposed to provide Asphalt surface for all main roads, Macadam / gravel surface for all lanes, and granite stone slab / brick paving for all by-lanes. Macadam roads are provided for all lanes to facilitate movement of Bullock carts with wheels having iron rims.

6.1.2 Sullage and Storm water drains:

The mere provision of paved roads in a village will not significantly contribute to improving environmental sanitation unless there is a network of sullage and storm water drains along the streets. In most villages today, the sullage water is commonly let on to the streets, which results in the streets remaining slushy and dirty most of the time. Pools of such sullage also act as breeding places for mosquitoes further endangering the health of the inhabitants.

The absence of storm water drains particularly in villages located in clayey soils of Northern Karnataka makes the streets full of slush during the monsoon season. Even where the local Panchayat has built drains they are often poorly designed and constructed, without serving their objective efficiently. Therefore, construction of properly designed network of sullage and storm water drains (along with soak pits wherever necessary) is an important part of promoting integrated village sanitation. Construction of sullage and storm water drains shall be linked to the paving / resurfacing of the streets. The drains shall be so designed that they shall finally lead off to a selected place outside the village to prevent stagnation of wastewater in the village.

Where the local circumstances like the topography or the highly scattered distribution of dwelling houses in the village do not permit

construction of a network drains in a cost effective manner, households shall be provided with soak pits, if sufficient place is available within the premises of their houses. They may also be educated and motivated to develop kitchen gardens to utilise sullage water.

6.1.3 Community compost yards and removal of manure pits:

Rural households, who are mainly dependent on agriculture value the manure derived from cow dung and garbage. Their lack of awareness about the health hazards of insanitary manure dumps and the inconvenience of transporting dung and garbage to their agricultural land frequently has made them have dumps of dung and garbage on any open space near their dwelling houses. The non-availability of earmarked space for manure pits outside the village and lack of knowledge of scientific composting have made these manure pits eyesores in every village and resulted in poor and insufficient composting of valuable organic wastes.

Improper / indiscriminate disposal of household solid waste, garbage and cowdung is becoming breeding places for flies, insects, etc attracting rodents. To prevent this health hazard, it is essential to design a proper system disposal of all household solid waste to individual or community compost pits.

Under the Total Village Sanitation approach, community compost yards will be identified outside the dwelling areas of the village where separate compost pits will be allotted to each household. The Gram Panchayat will ensure that each household shifts its manure dump to the allotted area in the community compost yards. The Gram Panchayats will also be enabled to acquire lands for community compost yards wherever common lands are not available for the purpose.

In this arrangement, each household could have their designated bins/pits at a common location at a reasonable distance from the village. The villagers would transport their household collections by means of cart/trolley etc. and utilise the composted manure from their pits after a period of time. It would be useful to have people trained in scientific composting of manure to make the new compost yards a profitable experiment for the users.

6.1.4 Smokeless Chullas / Bio-gas plants:

Rural households commonly use bio fuels like fuel wood, cowdung cakes, etc., for cooking. These fuels emit large quantities of smoke, which makes the domestic environment in the rural households very unhealthy. Poor ventilation in the dwelling houses combined with the use of smoke emitting fuels in the kitchen cause upper respiratory infections and conjunctivitis particularly among women and children. Widespread incidence of upper respiratory infections among women children is a cause for concern in the rural areas. Hence, as a first step, it is important to take preventive measures by promoting smokeless Chulhas (wood burning stoves) in every rural household.

Specially designed smokeless chullas with chimneys are being provided under the National Programme for Improved Chullas, which is being implemented by the Department of Rural Development and Panchayat Raj. The new rural sanitation strategy will integrate the promotion of smokeless chullas with the other elements of Integrated Village Sanitation. Every village covered under the programme will be converted into a smokeless village with each house being provided with an appropriate smokeless chulla or wherever feasible, a biogas plant.

6.2 Construction of Latrines:

One of the essential elements of the Total Village Sanitation will be to promote use of latrines by the people in the villages. Specially designed latrines suitable for different areas of the State will be promoted so that rural households can adopt use of latrines as an integral part of their lives. This component of the Panch Sutra strategy will be implemented in four ways.

- Promoting twin pit hand pour flush household latrines.
- Promoting twin pit hand pour flush group latrines with individual ownership.
- Promoting community latrine complex.
- Promoting institutional latrines (school sanitation, etc.).

6.2.1 Household Latrines

Household latrines will be promoted in all the houses, which have minimum space to construct a twin pit pour flush latrine or a single pit pour flush latrine if the space available with the user households is not sufficient for construction of a twin pit latrine. As an integral part of the Total Village Sanitation Programme, the Grama Panchayat will take the following measures to promote household latrines in the villages.

1. All households which have minimum space shall construct household latrines.
2. All new houses being built in the village shall have an attached household latrine. Wherever old houses are reconstructed, such houses shall also construct a household latrine.
3. Houses constructed under 'Ashraya' and other housing schemes for weaker sections of the society or in submersion / rehabilitation areas shall be constructed with household latrines.

6.2.2 Group Latrines With Individual Ownership

It is also essential to promote group latrines built on public sites with individual ownership for rural households who do not have minimum space to construct household latrines near their houses. Group Latrines will be promoted with suitable design wherever land is available with gram panchayat or where villagers donate land near the houses of people willing to take up ownership with maintenance responsibility of such latrines. This model will have a minimum of five latrines in a row. The design of this model will be made available to all GPs.

6.2.3 Community Latrine Complex

Promotion of household latrines has not been possible in many villages, especially in northern Karnataka for the following reasons:-

1. Lack of space
2. Closely built clusters of houses
3. Non-affordability among poorest of the poor.
4. Unsuitability of the site due to rocky strata or waterlogging.
5. Unwillingness of people to have latrines located next to or within their houses.

Though the community is aware of the advantages of household latrine, because of the reasons as above, they are unable to construct latrines of their own. Hence, it is essential to promote community latrine complexes in the villages in order to promote Total Village Sanitation. However, it is necessary to ensure that these complexes are properly maintained if they have to be useful to the community on a sustainable basis. The Gram Panchayats will therefore have to be made responsible

for ensuring regular water supply as well as proper maintenance of the Community Complexes. If necessary, users will have to be motivated to pay a minimum charge for using the latrines, either twice a year or once a year according to their capacity, so that pay and use concept is inculcated in their minds. The user charges to be collected may be decided in the Grama Sabha. The GP may allow women and children as well as the poorest of the poor to use the toilet without charging.

During local fairs and festivals, the GP will make elaborate arrangements to provide the required number of temporary toilets with adequate water supply to prevent any health hazard and out break of gastro-enteritis cases during or after fairs and festivals.

6.2.4 Institutional Latrine

Latrine facilities in village institutions, such as Gram Panchayaths, Anganwadis, Schools and co-operative societies, etc. in turn will influence the members of these institutions to promote household latrines in their respective houses. However, these institutions should ensure proper use and maintenance of latrines by providing adequate water and regular cleaning.

6.2.5 School Sanitation Programme

The school health education programme enables the students to learn desirable health and hygiene practices. School children who are used to better sanitation practices at school will be able to carry the message to their families and their communities. It is thus a good strategy to promote rural sanitation by creating awareness and imparting knowledge to the school children about the following:-

- Advantages of latrine sanitation, and the proper use and maintenance of latrines.

- Importance of personal hygiene.
- Developing the school garden.
- Holding periodical hygiene awareness jathas and shramadans.

There are about 46,900 primary schools in the State with about 82.00 lakhs children in the age group of 5 to 13 years. The State is contemplating provision of facilities for School Sanitation in at least 2000 schools per year starting with 2000-2001.

In order to promote school sanitation schools in the villages will be provided with the required number of latrines and urinals separately for boys and girls. The Gram Panchayats will construct the School latrine complex in all Higher Primary and Higher Secondary Schools. The school authorities will ensure the proper use and maintenance of these facilities with the active involvement of the teachers and students. The periodical repairs will be carried out by GP/TP/ZP. The Chief Executive Officer, Z.P. will make necessary arrangements through the concerned Deputy Director of Public Instruction of the District to ensure that all private educational institution also construct the required number of latrines and urinals with regular water supply facilities and ensure their proper use and maintenance.

Apart from providing toilet facilities to the students, it is also essential to create awareness on desirable personal hygiene practices and encourage students to adopt the same. Sanitary conditions in the campus are to be improved by engaging students in maintenance of a school garden. The Zilla Panchayath shall provide necessary assistance through the Horticulture and Forest Departments.

6.3 RURAL SANITARY MART

The demand for household latrines has been very encouraging under the Nirmala Grama Yojana and in all the externally aided projects.

The progress achieved in implementation of the NGY is also an indicator of the gradual acceptance of household sanitary latrines in the rural areas. Women in particular are encouraged to use these because of the privacy they lacked so far. This attitudinal change has occurred because of an intensive IEC campaign. In order to meet the demand generated the required materials should be made available for constructing household latrines in time and at an affordable price, when the interest is still fresh in the minds of the willing households to construct a sanitary latrine. Local institutions such as the Primary Agricultural co-operative societies, Taluk Agricultural Produce Co-operative Marketing Societies, NGOs, CBOs, Self Help Groups, Mahila Swasthya Sanghas, DWACRA groups, etc may be encouraged to open Rural Sanitary Martis wherever necessary.

6.4 ENVIRONMENTAL SANITATION

6.4.1 Dustbins

Increasing urbanisation has created problems of Solid waste disposal in rural areas too and it needs to be arrested before it assumes alarming proportions. Therefore, dustbins need to be provided according to the requirement of the village. These dustbins shall be placed at appropriate places in consultation with the local community. The dustbins will be utilised by the petty shopkeepers, and households for disposing non-bio degradable waste such as plastic items, tins, bottles etc. Such households who do not own livestock and who may not opt for manure pits will in particular require the facility of dustbins to dispose of waste material.

The GPs will ensure that every household disposes of biodegradable household waste in the compost yard and non-bio degradable waste to dust bins. The GPs will also make necessary

arrangements for regular cleaning of dustbins to prevent possible health hazards.

6.4.2 Washing Platforms

Women washing clothes and men cleaning domestic animals at public water points are very common sights in the villages. Such unhealthy practices cause water-borne diseases, which are almost endemic in certain areas due to stagnation of water and cesspools. In black cotton soil areas, even to collect water for drinking and cooking becomes difficult around water collection points. In order to avoid this undesirable practice, adequate number of washing platforms will be provided along with small water storage tanks and proper lead off to the drain.

6.5 I.E.C. FOR ATTITUDINAL CHANGE

Even though the demand for latrines from rural households has increased in Karnataka during the last few years, a great deal of attitudinal change is still required to get a majority of the rural households to adopt latrine sanitation. Total village sanitation, however, encompasses many other habits and attitudes of people beyond the mere use of latrines. A large scale and sustained I.E.C. campaign, will be necessary to not only increase peoples awareness and knowledge about various aspects of sanitation, but also to create an effective demand for these services so that the people value the facilities adequately to contribute part of the capital cost and take responsibility for their future maintenance. The cooperation of the people in the villages will need to be mobilised for shifting of manure pits and for making other sacrifices to facilitate construction of drains, paving of roads, etc. The Panchayaths will need to enforce certain standard sanitation practices in

the village if the environmental sanitation in the village is to be sustained. This will require I.E.C. strategies applied over a period of time.

Karnataka has considerable experience in the use of Non Governmental Organisations for Health, Sanitation and Hygiene education in the rural areas. In all the three externally aided projects in the sector of rural water supply and sanitation, the services of NGOs has been used for the purpose to varying degrees. A detailed strategy for conducting I.E.C. campaigns involving NGOs and Grama Panchayats needs to be worked out to make Total Village Sanitation a success.

6.6 CAPITAL COST CONTRIBUTION AND MAINTENANCE :

The Karnataka Panchayat Raj Act provides that creation and maintenance of Rural Sanitation facilities in rural areas shall be the responsibility of Gram Panchayats. Therefore, the GPs shall be made the focal point for implementation of the Village Sanitation measures. The GPs shall be responsible for planning, implementation, project fund management and maintenance of sanitation facilities in the villages. The programme for total village sanitation on the lines of Panchasutras is to be implemented with the active participation of the village communities concerned.

In order to create a sense a ownership of the assets created and to make the GPs and user communities responsible for maintenance, it is proposed that the GPs and the user communities share the capital cost of the project. The Gram Panchayats will serve as institutions mobilising people's participation not only in terms of sharing the cost of the programme but also in terms of taking up the full responsibility for the maintenance of the facilities created.

CHAPTER-VII

IMPLEMENTING TOTAL VILLAGE SANITATION

7.0 THE INSTITUTIONAL ARRANGMENTS

As indicated earlier, the major responsibility for implementing the Panchasutra approach to total sanitation is to be shouldered by the Grama Panchayats, keeping in view the need for adopting a participatory and demand responsive approach. Only such GPs which come forward to take up the responsibility for mobilising the communities for the implementation of the project will be selected for the programme.

- The GP passes a resolution to adopt Panchasutras for total sanitation in one or more of its villages;
- The GP registers its request for inclusion in the programme with the Zilla Panchayat along with a deposit of a prescribed amount ;
- The GP passes a resolution, after consulting the Grama Sabha of the village concerned, agreeing to collect taxes and user charges to meet the full cost of the maintenance of the facilities created;
- The GP agrees to arrange for periodical maintenance of the sanitation facilities including the daily maintenance of community latrines, weekly cleaning of the paved streets, and monthly maintenance of sullage and storm water drains;
- The GP agrees to maintain the public stand posts of piped water supply and other water points to prevent any stagnation of water around them and get the water from every source analysed for chemical and bacterial contamination at least twice every year;

- * The GP agrees to enforce a regulation to prevent the location of any manure pits/manure dumps within specified limits of the dwelling area of the village and agrees to have all existing manure dumps shifted outside such limits; and
- * TH GP prepares a detailed budget for meeting expenditure on maintenance of facilities created under the Panchasutra, like the roads, drains, community latrines and compost yards.

7.1 ORDER OF PRIORITY :

A demand responsive approach to select GPs and habitations within the selected GPs will be followed. A self-selection process based on transparent eligibility and prioritisation criteria shall be developed and followed for the purpose. Preference will be given to larger habitations facing special problems of sanitation like water logging, high incidence of communicable diseases etc.

7.2 PREPARATION OF TOTAL VILLAGE SANITATION PROJECTS : CHOICE OF TECHNOLOGY :

The GPs shall be responsible for planning the Total Village Sanitation Projects (TVSP). The Zilla Panchayats (ZPs) shall provide the required technical assistance to the GPs in the preparation of the projects. The Zilla Panchayat Engineering Division shall be strengthened and trained in different methods of design, quality control and preparation of project reports. The services of agencies like the Karnataka Land Army Corporation can also be made use of for the purpose. Private sector consultants and technical education institutions will be involved in providing technical support to Grama Panchayats. These agencies are to act as technical assistance partners to Grama

Panchayats who are to assume the responsibility of implementing the rural sanitation projects. Grama Panchayats will decide on the choice of technology and level of sanitation service they are willing to finance. The Government will however prescribe a capita and per Grama Panchayat ceiling on budgetary support along with a time limit for implementing the project.

7.3 PARTICIPATORY APPROACH

The master plan proposes to promote and facilitate participation of the NGOs and the private sector and to enable Panchayat Raj institutions and the user community groups to assume the lead role in decision-making. The Grama Panchayats will be responsible for planning, construction and maintenance of facilities with the technical support of Zilla Panchayats / KLAC. The Grama Panchayats will empower user groups (Village Water and Sanitation Committees - VWSCs) to perform the above functions as necessary.

There will be a TVS Committee at the district level to monitor the implementation of the programme. Once a Grama Panchayat is selected for the programme by fulfilling the prescribed conditions, the TVSP committee of the Zilla Panchayat will designate a Project Support Agency (PSA) to assist the Grama Panchayat in planning and executing the TVSP in the habitation concerned. Such PSA, which may be a technical institution, a NGO or the KLAC, will then prepare detail plans and estimates for the TVSP in the villages identified by the Grama Panchayat following a Participatory Rural Appraisal (PRA) exercise. The plans shall then be discussed in the Panchayat meeting and in the Gram Sabha and any modifications required shall be effected in the light of such discussions. The above meeting will also confirm the willingness of the

village committees to abide by the conditions of cost sharing and taking over the responsibility for the maintenance of the facilities.

The GP will then deposit at least 50% of the agreed community contribution with TVSP fund of the Zilla Panchayat. The TVSP plans and estimates shall be then scrutinised by the TVSP Cell of the Zilla Panchayat for technical approval. After such technical approval is accorded, the Zilla Panchayat will release the 1st instalment of the estimated cost to the GPs. All project funds shall be released by the Zilla Panchayats to the Grama Panchayats in instalments. The Grama Panchayats would be responsible for management of the project funds including expenditure and accounting. The Zilla Panchayat shall ensure that adequate checks and balances are prescribed for proper utilisation of the funds. The PSA will assist the GP in getting the works executed by providing technical supervision and by certifying the works carried out. As far as possible, the works will be executed in the following sequence.

1. installation of smokeless chulhas;
2. identification of sites for community compost yards and notice to shift manure pits;
3. shifting of manure pits to community compost yards;
4. identification of sites for construction of community latrines;
5. construction of community and institutional latrines;
6. construction of household latrines;
7. construction of drains;
8. paving of internal roads/streets.

The PSA will be paid such service charges as may be fixed by the TVSP committee of the Zilla Panchayat. The PSA will also be responsible for motivating and training the village communities and conduct IEC activities to ensure sustainability of the facilities created.

7.4 CAPITAL COST SHARING AND OPERATION AND MAINTENANCE :

The programme of Total Village Sanitation on the lines of Panchasutras is to be implemented with the active participation of village communities concerned. The Gram Panchayats will serve as the institutions mobilising people's participation not only in terms of sharing the cost of the programme but also in terms of taking up the full responsibility for the maintenance of the facilities created. In order to create a sense a ownership of the assets created and to make the GPs and user communities responsible for maintenance, it is proposed that the GPs and the user communities share the capital cost of the project as follows :

Gram Panchayats -	10 % of the project cost
User Community -	5 % of the project cost
Project Finance -	85 % Of the project cost

7.5 FINANCIAL REQUIREMENT – ESTIMATING PER CAPITA COSTS

In order to arrive at the likely per capita capital cost of investment for two main components of the Panchasutra Strategy, namely, the paving of internal roads and construction of the drains, the works executed in a sample of 134 villages of Mysore and Mandya Districts were taken for a study. These villages are covered under the World Bank Assisted Integrated Rural Water Supply and Environmental Sanitation Project. The actual length of roads and lanes in these villages as available from the village layout maps was measured and quantified. The cost per unit of length of road was worked out base on the prevailing schedule of rates of the year 1999-2000. A random study of village maps reveals that the normal percentage of main roads (asphalt roads) in a village works out to around 30% and the lanes (Macadam roads) to around 30% and 10% for paving of by-lanes Since these works are proposed for

execution from the year 2001 onwards, 10% escalation is added @ 5% per year. The details of calculation and data may be seen at Annexure-XIII. The expected average per capita cost towards this component of Panchasuthra works out to Rs.287.00.

Adopting a similar approach, the actual length of drains in these villages as available from the village layout maps was measured and quantified. Only two types of drains were taken into consideration. One with size stone masonry to serve as the trunk main and the other with Pre cast concrete "U" shaped drains of varying sizes from 15 inches to 24 inches depth to serve as house and street drains respectively. Rates for these items have been worked out based on the prevailing schedule of rates. A random study of villages reveals that out of the overall length of drains in a village, the requirement of Pre cast concrete "U" shaped drains would come to about 70% and that of size stone masonry drains to about 30%.

The estimates are prepared on the above lines for 134 villages so as to cover all the streets in a village. These estimates are based on actual prevailing costs worked out by adopting schedule of rates of the year 1999-2000. Since these works are proposed for execution from the year 2001 onwards, 10% escalation is added. The details of calculation and data may be seen at Annexure-XIV. The expected average per capita capital cost towards the sullage and storm water drains works out to Rs.626.24.

7.5.1 Manure Pits :

In calculating the cost of providing alternative manure pits, it is assumed that an average land area of 10' X 10' (100 sq.ft.) would be required for depositing the solid waste generated from a rural household for the purpose of converting it into compost. About 40% of the land area

in the Community Compost Yard needs to be earmarked towards bunds, pathways etc. The average cost of land per acre is assumed as Rs.40,000 per acre (Rs.100,000 per hectare) which is generally the prevailing market rate near the village in dry areas. Further, about 25% of the cost is taken towards development charges like formation of pits, fencing etc.

The per capita capital cost towards this component of Panchasutra is calculated as follows :

A	Area required per household	100 sq ft.
B	1 Acre =	43,560 sq ft.
C	60% of area per acre to be utilised for compost yards, leaving 40% for bunds, pathways etc. $C=B \times .6$	26,136 sq ft.
D	No. of households to be accommodated in 1 Acre $D=C / A$ (whole number is taken)	261
E	Cost of land per Acre	Rs.40,000
F	25% towards development charges ($F=E \times .25$)	Rs.10,000
G	Cost of developed land per Acre ($G=E+F$)	Rs.50,000
H	Capital cost per household ($H=G/D$)	Rs.191.60
I	Capital cost per capita (5 persons per household) $I=H/5$	Rs.38.32

7.6 PER CAPITA COST

The approximate per capita costs of various components of the programme are estimated on the basis of the assumptions explained below:

7.6.1 Lane Paving –

- Per capita capital cost of Rs 287.00 as indicated by the sample data for the Northern maidan and the Southern Maidan areas. It is expected that this will increase to about Rs.400 per capita due to better quality paving proposed.
- In the Malnad area, the requirement is reduced to 60% because of different terrain conditions.
- In Coastal areas, the requirement is expected to be not more than 30% as the housing pattern is significantly different.
- 10 % facilities exist presently.

7.6.2 Drains –

- Per capita capital cost of Rs 626.24 as indicated by the sample data for the Northern maidan and the Southern Maidan areas. This is proposed to be limited to Rs.500 by adopting cost effective designs.
- In the Malnad area, the requirement is reduced to 60% because of different terrain conditions.
- In Coastal areas, the requirement is expected to be not more than 30% as the housing pattern is significantly different.
- 25 % facilities exist presently.

7.6.3 Manure Pits –

- Per household capital cost of Rs 191.6 as calculated.
- Approximately 40% households only may opt for this component. (The number of agricultural labourers and cultivators is 40% of rural population)

7.6.4 Household Latrines –

- A subsidy of Rs. 2000 for Below Poverty Line (BPL) households and Rs. 1200 for Above Poverty Line (APL) households.
- A Target Coverage of 50%.
- Current coverage level is 10%.
- 50% of household latrines constructed in the Master Plan for BPL households and remaining 50% for APL households. Hence an average subsidy of Rs. 1600 is disbursed.

7.6.5 Community Latrines –

- Unit cost of Rs. 1,00,000.
- One Unit per habitation. Larger habitations may require more than one unit whereas smaller habitations may not require or demand any. Existing facilities in some villages may only require rehabilitation.

7.6.6 School Sanitation Programme –

- Unit cost of Rs.1,00,000.
- One Unit per habitation. Larger habitations may require more than one unit whereas smaller habitations may not require. Existing facilities in many schools / villages may only require rehabilitation. Facilities created in recent years by the Education department may reduce the requirement.

7.6.7 Institutional Support / IEC –

- Unit cost of Rs.50,000 per habitation
- The amount is to be utilised for incurring expenditure towards the fees to be paid to Project Support agency, consultancy charges of private consultants / NGOs, strengthening the GPs, administrative cost and conducting IEC campaign.

On the basis of the above assumptions the average per capita cost of the Total Village Sanitation with a Panchasutra approach would work out to about Rs.1216.00. Thus, for an average village with about 500 households, the approximate cost of sanitation works out to Rs.30.40 Lakhs. The item-wise typical per capita and per village calculations (for a village of 500 households) are shown below:

Sl.No.	Sanitation Components	Per Capita (Rs.)	Per Village (Rs. In lakhs)
1	Lane paving	400.00	10.00
2	Drains	500.00	12.50
3	Manure Pits	20.00	0.50
4	Household Latrines subsidy 1600 X 250	160.00	4.00
5	Improved Chulhas subsidy for 500 households	20.00	0.50
6	Community Latrines	40.00	1.00
7	School Sanitation	40.00	1.00
8	Institutional Support/ IEC	20.00	0.50
	TOTAL		30.00

7.7 PHASING OF THE PROGRAMME :

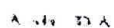
Total Village Sanitation with the Panchasutra approach represents a major expansion of the scope and dimension of the State's efforts to promote rural sanitation and would involve per capita investments in the sector on unprecedented scale. It is therefore, both inevitable and desirable that it is implemented in a phased manner with a substantial number of the State's villages tackled in the first phase of about five years to make a perceivable impact on the quality of life in the rural areas of the State. Such an impact can be created best by improving conditions in the villages with somewhat larger populations. Also, the villages need to be spread out in all parts of the village for the demonstration effect to result in a change in the life styles of the rural people.

Keeping the above factors in view, the State can realistically aim at a sanitation services coverage of about thirty per cent of the rural population in a period of five years commencing with the year 2000-2001 which can be the first phase of the programme. At the end of the first phase in the year 2005-2006, the State will have about fifty per cent of the rural population with access to rural sanitation (at least latrine sanitation) taking into account more than ten per cent of the population who already have access to sanitation and those who will acquire these facilities by their own efforts without any investment from the State. Thus, if about 30 to 33 per cent of the rural population (about 12 millions) have to be provided with sanitation services at a per capita cost of about Rs.1,500, the total investments will be of the order of about Rs.1,800 crores. (Details at Annexure-XV) These investments will have to be made in about 6000 villages of about 2000 population on the average. This would also mean that the Total Sanitation Package could be implemented at least in one village in every Grama Panchayat in the

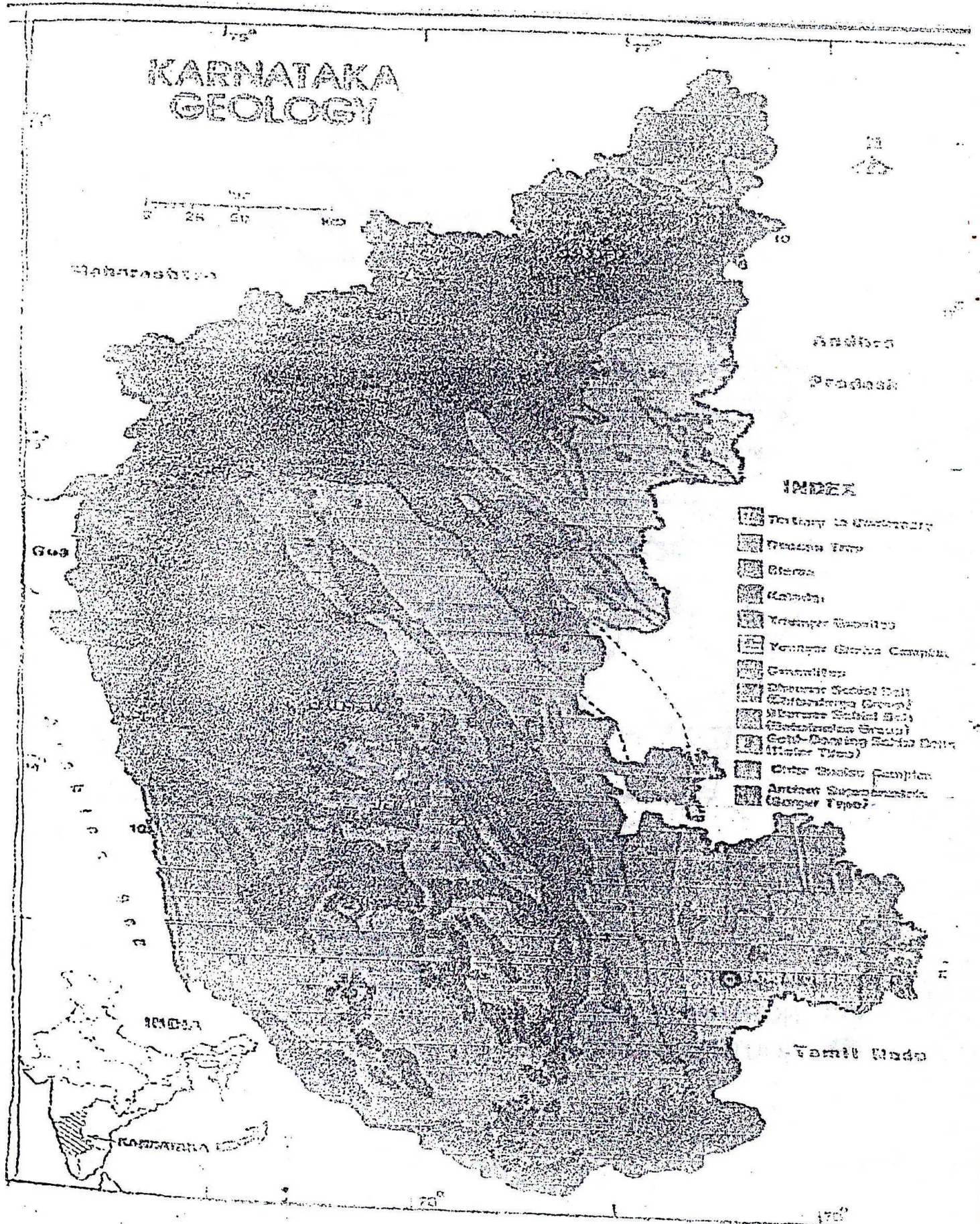
State, assuming that the Panchayat seeks to participate in the programme by fulfilling the conditions stipulated for the purpose. The remaining villages in the State could be considered for inclusion in the programme in the second and subsequent phases after the year 2006-2007.

Even though on the face of it, the programme of Total Village Sanitation looks ambitious, it should be appreciated that the level of investments proposed, about Rs. 360 crores per year is both feasible and necessary. It is possible to mobilise about fifteen per cent of these investments from the communities and the Grama Panchayaths and the remaining eighty five per cent needs to be funded by the State. Such a level of investment in rural sanitation, amounting to about Rs. 300 crores per year appears realistic, particularly in the context of the State government having already decided to invest Rs.200 crores on the programme during 2000-2001 with financial assistance of about Rs.160 crores obtained from the Housing and Urban Development Corporation (HUDCO). Another Rs. 40 crores is to be mobilised partly from the rural communities and partly as direct budgetary support from the State Government.

PHYSIOGRAPHIC REGIONS OF KARNATAKA



ANNEXURE-II



ANNEX - III

STATUS OF GROUND WATER DEVELOPMENT OF THE TALUKS WHICH ARE CONSIDERED AS CRITICAL

Region (1)	District (2)	Dark Taluks (>85 %) (3)	Grey Taluks (>65% to <85%) (4)	Intermediate Taluks (>50% to <65%) (5)
The Coastal Plains	1 Dakshina Kannada	1. Banwal 2. Suiya	1. Belthangadi	1. Puttur
The Malnad Region	1 Hassan	1. Channarayana	1. Arasikere	
The Northern Maidan	1 Belgaum	1. Chikkodi 2. Hukkeri	1. Athani 2. Bailhongal	1. Belgaum 2. Gokak 3. Raibagh 4. Soundathi
	2 Bellary		1. H.B. Halli	1. H. Hadagali 2. Kudligi
	3. Bidar		1. Bidar	1. Humnabad
	4 Bijapur	1. Indi	1. Bagewadi	1. Mudhol 2. Jamkhandi 3. Sindhagi
	5 Koppal		1. Kustagi	1. Koppal 2. Yelburga
	6 Bagalkot			1. Bagalkot
	7 Haveri			1. Hirekerur 2. Ranibennur 3. Haveri
	8 Gadag			1. Naragund
The Southern Plains	1 Bangalore (Urban)	1. Anekal 2. Bangalore North 3. Bangalore South	1. Doddaballapur 2. Ramanagar	
	2 Bangalore (Rural)	1. Channarayana 2. Devanahalli 3. Hosakote		
	3 Chitradurga		1. Challakere 2. Chitradurga	1. Hirivur 2. Jagalur 3. Malakalmuru

	4. Kolar	1. Chikkaballapur 2. Kolar 3. Malur	1. Chintamani 2. Gowribidanur 3. Mulbagal 4. Sidlaghatta 5. Srinivasapur	1. Bagepalli 2. Bangarpet 3. Gudibande
	5. Tumkur	1. Gubbi 2. Madhugiri 3. Tiptur 4. Tumkur 5. Turuvekere	1. Koratagere 2. Kunigal 3. Sira	1. C.N. Hall 2. Pavagada
	6. Davanagere			1. Davanagere
	7. Chamarajanagar	1. Kollegal	1. Chamarajanagar	2. Channarayana 1. Yelandur

ANNEXURE - IV
Rainfall and Forest Area in Karnataka

Region		District	Geographical Area (sq kms)	Normal Rainfall (mm)	Forest Area (sq kms)	% of Forest Area
The Coastal Area	1	Dakshina Kannada	4,843.00	3,975	2,894.97	59.78%
	2	Udipi	3,598.00	4,119	2,150.76	59.78%
	3	Uttara Kannada	10,291.00	2,835	8,291.51	80.57%
		Region Total	18,732.00	3,643	13,337.24	71.20%
The Malnad	4	Kodagu	4,102.00	2,718	1,234.12	30.09%
	5	Hassan	6,814.00	1,031	541.07	7.94%
	6	Chikkamagalur	7,201.00	1,925	2,179.08	30.26%
	7	Shimoga	8,465.00	1,664	2,662.45	31.45%
		Region Total	26,582.00	1,835	6,616.72	24.89%
The Northern Plains	8	Bidar	5,448.00	847	482.31	8.85%
	9	Gulbarga	16,224.00	777	1,137.85	7.01%
	10	Raichur	5,559.00	631	432.29	7.78%
	11	Koppal	8,458.00	572	657.73	7.78%
	12	Bellary	8,419.00	636	1,485.11	17.64%
	13	Bijapur	10,475.00	578	505.86	4.83%
	14	Bagalkot	6,592.00	562	318.34	4.83%
	15	Dharwad	4,230.00	772	418.49	9.89%
	16	Gadag	4,657.00	612	460.74	9.89%
	17	Haveri	4,851.00	753	479.93	9.89%
	18	Belgaum	13,415.00	808	2,228.65	16.61%
		Region Total	88,328.00	686	6,607.30	9.74%
The Southern Plains	19	Davangere	6,018.00	649	1,260.27	20.94%
	20	Chitradurga	8,388.00	573	1,207.87	14.40%
	21	Tumkur	10,598.00	688	866.90	8.18%
	22	Bangalore (U)	2,190.00	867	319.69	14.60%
	23	Bangalore (R)	5,815.00	817	848.86	14.60%
	24	Kolar	8,223.00	744	1,039.41	12.64%
	25	Mandya	4,961.00	700	193.79	3.91%
	26	Mysore	6,269.00	782	2,164.02	34.52%
	27	Chamarajanagar	5,685.00	751	1,962.43	34.52%
		Region Total	58,147.00	730	9,863.24	16.96%
State Total			191,789.00	1,199	38,424.50	20.03%

ANNEXURE - V
Villages, Hamlets and Total Habitations in Karnataka

Region	District	No. of Villages	No. of Hamlets	Number of Habitations
The Coastal Area	1 Dakshina Kannada	371	2,766	3,137
	2 Udipi	244	3,657	3901
	3 Uttara Kannada	1,264	4,376	5640
	Region Total	1,879	10,799	12,678
The Malnad	4 Kodagu	291	282	573
	5 Hassan	2,369	1,531	3900
	6 Chikkamagalur	1,021	2,345	3366
	7 Shimoga	1,440	2,984	4424
	Region Total	5,121	7,142	12,263
The Northern Plains	8 Bidar	587	225	812
	9 Gulbarga	1,295	1,001	2296
	10 Raichur	808	411	1219
	11 Koppal	588	121	709
	12 Bellary	517	651	1168
	13 Bijapur	639	289	928
	14 Bagalkot	608	26	634
	15 Dharwad	455	39	494
	16 Gadag	307	43	350
	17 Haveri	582	48	630
	18 Belgaum	1,138	368	1506
	Region Total	7,524	3,222	10,746
The Southern Plains	19 Davangere	786	298	1084
	20 Chitradurga	932	437	1369
	21 Tumkur	2,537	2,947	5484
	22 Bangalore (U)	681	604	1285
	23 Bangalore (R)	1,713	1,681	3394
	24 Kolar	2,889	853	3742
	25 Mandya	1,365	508	1873
	26 Mysore	1,203	731	1934
	27 Chamarajanagar	446	384	830
	Region Total	12,552	8,443	20,995
State Total		27,076	29,606	56,682

ANNEXURE - VI
POPULATION 1991 CENSUS : KARNATAKA

Region	District	Population 1991 Census						
		Total	Rural	Rural %	SC	SC %	ST	ST %
The Coastal Area	1 Dakshina Kannada	1,633,392	1,115,818	68.31%	114,272	7.00%	64,493	3.95%
	2 Udupi	1,060,872	815,852	76.90%	61,276	5.78%	41,666	3.93%
	3 Uttara Kannada	1,220,260	925,744	75.86%	91,990	7.54%	10,168	0.83%
	Region Total	3,914,524	2,857,414	73.00%	267,538	6.83%	116,327	2.97%
The Malnad	4 Kodagu	488,455	410,514	84.04%	59,009	12.08%	40,312	8.25%
	5 Hassan	1,569,684	1,296,962	82.63%	273,379	17.42%	16,581	1.06%
	6 Chikkamagalur	1,017,283	845,422	83.11%	195,852	19.25%	26,534	2.61%
	7 Shimoga	1,452,259	981,171	67.56%	236,526	16.29%	32,948	2.27%
	Region Total	4,527,681	3,534,069	78.05%	764,766	16.89%	116,375	2.57%
The Northern Plains	8 Bidar	1,255,798	1,010,095	80.43%	260,033	20.71%	104,215	8.30%
	9 Gulbarga	2,582,169	1,972,366	76.38%	610,641	23.65%	106,935	4.14%
	10 Raichur	1,351,809	1,019,758	75.44%	249,148	18.43%	120,444	8.91%
	11 Koppal	958,078	810,007	84.54%	148,775	15.53%	59,828	6.24%
	12 Bellary	1,656,000	1,125,746	67.98%	311,252	18.80%	147,869	8.93%
	13 Bijapur	1,533,448	1,234,015	80.47%	291,513	19.01%	17,360	1.13%
	14 Bagalkot	1,394,542	1,005,229	72.08%	218,349	15.66%	22,175	1.59%
	15 Dharwad	1,374,895	652,726	47.47%	124,645	9.07%	23,396	1.70%
	16 Gadag	859,042	561,085	65.32%	118,850	13.84%	20,534	2.39%
	17 Haveri	1,269,213	1,065,448	83.95%	167,004	13.16%	61,169	4.82%
	18 Belgaum	3,583,606	2,741,820	76.51%	406,955	11.36%	83,076	2.32%
	Region Total	17,818,600	13,198,295	74.07%	2,907,165	16.32%	767,001	4.30%
The Southern Plains	19 Davangere	1,559,222	1,118,714	71.75%	302,344	19.39%	155,600	9.98%
	20 Chitradurga	1,312,717	1,095,247	83.43%	285,621	21.76%	222,763	16.97%
	21 Tumkur	2,305,819	1,923,656	83.43%	408,524	17.72%	167,632	7.27%
	22 Bangalore (U)	4,839,162	669,909	13.84%	711,775	14.71%	53,631	1.11%
	23 Bangalore (R)	1,673,194	1,369,908	81.87%	326,599	19.52%	49,305	2.95%
	24 Kolar	2,216,889	1,699,906	76.68%	570,400	25.73%	153,019	6.90%
	25 Mandya	1,644,374	1,377,570	83.77%	226,626	13.78%	11,936	0.73%
	26 Mysore	2,281,653	1,465,034	64.21%	391,780	17.17%	63,399	2.78%
	27 Chamarajanagar	883,365	759,690	86.00%	206,141	23.34%	38,703	4.38%
	Region Total	18,716,395	11,479,634	61.33%	3,429,810	18.33%	915,988	4.89%
State Total		44,977,200	31,069,412	69.08%	7,369,279	16.38%	1,915,691	4.26%

ANNEXURE - VI
POPULATION 1991 CENSUS : KARNATAKA

Region	District	Population 1991 Census						
		Rural	Urban	Male	Female	Main Workers	Marginal Workers	Non Workers
The Coastal Area	1 Dakshina Kannada	1,115,818	517,574	808,820	824,572	708,097	32,385	982,910
	2 Udipi	815,852	245,020	497,436	563,436	404,352	18,080	638,440
	3 Uttara Kannada	925,744	294,516	620,697	599,563	428,663	44,494	747,103
	Region Total	2,857,414	1,057,110	1,926,953	1,987,571	1,541,112	94,959	2,368,453
The Mainad	4 Kodagu	410,514	77,941	246,869	241,586	220,248	9,888	258,319
	5 Hassan	1,296,962	272,722	785,144	784,540	589,529	105,108	875,047
	6 Chikkamagalur	845,422	171,861	514,526	502,757	412,276	45,182	559,825
	7 Shimoga	981,171	471,088	739,561	712,698	542,419	39,335	870,505
	Region Total	3,534,069	993,612	2,286,100	2,241,581	1,764,472	199,513	2,563,696
The Northern Plains	8 Bidar	1,010,095	245,703	643,191	612,607	466,610	34,033	755,155
	9 Gulbarga	1,972,366	609,803	1,316,088	1,266,081	1,039,922	72,269	1,469,978
	10 Raichur	1,019,758	332,051	683,258	668,551	555,529	26,675	769,605
	11 Koppal	810,007	148,071	483,701	474,377	415,466	28,614	513,998
	12 Bellary	1,125,746	530,254	842,300	813,700	708,299	32,442	915,259
	13 Bijapur	1,234,015	299,433	787,257	746,191	576,877	54,609	901,962
	14 Bagalkot	1,005,229	389,313	703,762	690,780	533,411	54,258	806,873
	15 Dharwad	652,726	722,169	710,671	664,224	499,583	36,904	838,408
	16 Gadag	561,085	297,957	436,321	422,721	349,477	35,415	474,150
	17 Haveri	1,065,448	203,765	655,426	613,787	500,882	53,802	714,529
	18 Belgaum	2,741,820	841,786	1,834,005	1,749,601	1,340,802	176,924	2,065,880
	Region Total	13,198,295	4,620,305	9,095,980	8,722,620	6,986,858	605,945	10,225,797
The Southern Plains	19 Davangere	1,118,714	440,508	803,083	756,139	605,296	57,310	896,616
	20 Chitradurga	1,095,247	217,470	672,849	639,868	518,820	68,442	725,455
	21 Tumkur	1,923,656	382,163	1,177,233	1,128,586	916,196	183,394	1,206,229
	22 Bangalore (U)	669,909	4,169,253	2,542,950	2,296,212	1,635,987	22,311	3,180,864
	23 Bangalore (R)	1,369,908	303,286	860,231	812,963	623,043	96,513	953,638
	24 Kolar	1,699,906	515,983	1,128,316	1,088,573	881,514	81,070	1,254,305
	25 Mandya	1,377,570	266,804	837,597	806,777	635,593	96,170	912,611
	26 Mysore	1,465,034	816,619	1,168,291	1,113,362	822,406	62,382	1,396,865
	27 Chamarajanagar	759,690	123,675	452,333	431,032	360,819	26,672	495,874
	Region Total	11,479,634	7,236,761	9,642,883	9,073,512	6,999,674	694,264	11,022,457
State Total		31,069,412	13,907,788	22,951,916	22,025,284	17,292,116	1,594,681	26,180,403

ANNEXURE - VI
POPULATION 1991 CENSUS : KARNATAKA

Region	District	Main Workers - Population 1991 Census				
		Cultivators	Agricultural Labourers	Live Stock & Allied Activities	Mining	Household Manufacturing
The Coastal Area	1 Dakshina Kannada	100,186	89,095	56,553	2,770	5,634
	2 Udipi	119,138	89,784	18,363	1,858	6,518
	3 Uttara Kannada	141,345	82,283	56,937	5,180	8,275
	Region Total	360,669	261,162	131,853	9,808	20,427
The Malnad	4 Kodagu	43,854	33,188	85,613	905	1,260
	5 Hassan	336,246	85,145	43,749	2,909	5,380
	6 Chikkamagalur	148,111	101,932	71,991	3,408	4,278
	7 Shimoga	190,261	179,876	12,537	2,475	9,269
	Region Total	718,472	400,141	213,890	9,697	20,187
The Northern Plains	8 Bidar	137,791	212,739	5,110	2,203	6,516
	9 Gulbarga	316,492	461,055	24,175	14,406	16,906
	10 Raichur	175,796	264,178	6,462	5,603	6,322
	11 Koppal	142,499	192,594	5,028	1,708	10,635
	12 Bellary	227,663	289,605	8,690	15,721	9,687
	13 Bijapur	182,379	270,969	9,622	1,171	10,865
	14 Bagalkot	167,615	208,071	9,266	2,296	24,556
	15 Dharwad	137,297	151,664	5,706	1,094	9,313
	16 Gadag	104,186	148,001	5,593	652	10,917
	17 Haveri	163,545	227,954	7,146	897	11,091
	18 Belgaum	546,273	395,876	21,527	1,937	40,962
	Region Total	2,301,536	2,822,706	108,325	47,688	157,770
The Southern Plains	19 Davangere	211,923	223,783	7,330	1,516	9,826
	20 Chitradurga	219,126	168,665	15,835	3,055	12,912
	21 Tumkur	500,439	193,842	20,286	3,735	23,796
	22 Bangalore (U)	96,769	75,314	15,894	13,099	21,606
	23 Bangalore (R)	309,341	132,762	19,270	3,936	17,934
	24 Kolar	411,788	229,338	29,874	14,481	11,190
	25 Mandya	338,261	158,656	16,841	3,436	7,134
	26 Mysore	322,088	188,135	20,899	2,214	11,412
	27 Chamarajanagar	125,221	145,455	16,436	3,714	7,957
	Region Total	2,534,956	1,515,950	162,665	49,186	123,767
State Total		5,915,633	4,999,959	616,733	116,379	322,151

ANNEXURE - VI
POPULATION 1991 CENSUS : KARNATAKA

Region	District	Main Workers - Population 1991 Census				
		Non Household Manufacturing	Construction	Trade	Transport	Other
The Coastal Area	1 Dakshina Kannada	247,160	23,971	72,998	32,589	77,141
	2 Udipi	65,819	11,019	43,091	10,643	38,119
	3 Uttara Kannada	24,833	13,814	38,206	12,489	45,301
	Region Total	337,812	48,804	154,295	55,721	160,561
The Malnad	4 Kodagu	7,445	4,693	14,608	4,536	24,146
	5 Hassan	17,471	9,328	33,912	12,198	43,191
	6 Chikkamagalur	12,005	6,897	24,617	6,060	32,977
	7 Shimoga	35,261	11,912	43,992	12,587	44,249
	Region Total	72,182	32,830	117,129	35,381	144,563
The Northern Plains	8 Bidar	14,035	6,836	28,720	12,592	40,068
	9 Gulbarga	33,327	17,696	58,558	19,152	78,155
	10 Raichur	7,504	5,101	26,517	6,441	51,605
	11 Koppal	9,788	3,082	20,620	4,398	25,114
	12 Bellary	30,208	12,706	48,462	18,588	46,969
	13 Bijapur	12,637	9,955	30,865	10,427	37,987
	14 Bagalkot	38,892	7,939	32,976	8,136	33,664
	15 Dharwad	49,969	15,334	55,050	24,690	49,466
	16 Gadag	19,825	5,395	24,847	7,406	22,655
	17 Haveri	19,155	5,878	32,628	6,774	25,814
	18 Belgaum	88,004	29,148	85,496	27,758	103,821
	Region Total	323,344	119,070	444,739	146,362	515,318
The Southern Plains	19 Davangere	40,235	12,269	47,654	10,117	40,643
	20 Chitradurga	16,181	8,551	31,395	7,466	35,634
	21 Tumkur	38,836	13,091	48,958	13,848	59,365
	22 Bangalore (U)	492,149	133,070	321,086	124,240	342,760
	23 Bangalore (R)	50,067	7,450	34,141	9,415	38,737
	24 Kolar	48,377	12,488	52,915	15,817	55,246
	25 Mandya	21,374	10,071	33,389	7,523	38,909
	26 Mysore	70,690	26,599	74,936	25,498	79,935
	27 Chamarajanagar	17,728	3,679	19,317	3,576	17,736
	Region Total	795,637	227,268	663,791	217,500	708,965
	State Total	1,528,975	427,972	1,379,954	454,964	1,529,407

ANNEXURE - VI
POPULATION 1991 CENSUS : KARNATAKA

Region	District	Geographical Area (sq km)	Population 1991 Census		
			Density	Sex - Ratio	% Growth Rate (1981-1991)
The Coastal Area	1 Dakshina Kannada	4,843.00	337	1,019	13
	2 Udupi	3,598.00	295	1,133	13
	3 Uttara Kannada	10,291.00	119	966	13
	Region Total	18,732.00	209	1,031	
The Malnad	4 Kodagu	4,102.00	119	979	5
	5 Hassan	6,814.00	230	999	15
	6 Chikkamagalur	7,201.00	141	977	12
	7 Shimoga	8,465.00	172	964	15
	Region Total	26,582.00	170	981	
The Northern Plains	8 Bidar	5,448.00	231	952	26
	9 Gulbarga	16,224.00	159	962	24
	10 Raichur	5,559.00	243	978	29
	11 Koppal	8,458.00	113	981	29
	12 Bellary	8,419.00	197	966	27
	13 Bijapur	10,475.00	146	948	21
	14 Bagalkot	6,592.00	212	982	21
	15 Dharwad	4,230.00	325	935	19
	16 Gadag	4,657.00	184	969	19
	17 Haveri	4,851.00	262	936	19
	18 Belgaum	13,415.00	267	954	18
	Region Total	88,328.00	202	959	
The Southern Plains	19 Davangere	6,018.00	259	942	23
	20 Chitradurga	8,388.00	156	951	23
	21 Tumkur	10,598.00	218	959	16
	22 Bangalore (U)	2,190.00	2,210	903	38
	23 Bangalore (R)	5,815.00	288	945	15
	24 Kolar	8,223.00	270	965	16
	25 Mandya	4,961.00	331	963	16
	26 Mysore	6,269.00	364	953	22
	27 Chamarajanagar	5,685.00	155	953	22
	Region Total	58,147.00	322	941	
State Total		191,789.00	235	960	21

ANNEXURE - VII

Rural Water Supply : Karnataka : Ipcd Categorywise No of Habitations

Region	District	Number of Villages	Number of Habitations - Ipcd Categorywise					Total
			< 10 Ipcd	10 to 20 Ipcd	20 to 40 Ipcd	40 to 55 Ipcd	> 55 Ipcd	
The Coastal Area	1 Dakshina Kannada	371		746	989	453	949	3,137
	2 Udupi	244	76	404	1,177	669	1,575	3,901
	3 Uttara Kannada	1,264	75	144	648	821	3,952	5,640
	Region Total	1,879	151	1,294	2,814	1,943	6,476	12,678
The Malnad	4 Kodagu	291	152	131	159	60	71	573
	5 Hassan	2,369	13	82	375	409	3,021	3,900
	6 Chikkamagalur	1,021	13	77	444	340	2,492	3,366
	7 Shimoga	1,440	231	308	920	298	2,667	4,424
	Region Total	5,121	409	598	1,898	1,107	8,251	12,263
The Northern Plains	8 Bidar	587	53	77	136	42	504	812
	9 Gulbarga	1,295	43	309	763	474	707	2,296
	10 Raichur	808	59	166	306	137	551	1,219
	11 Koppal	588		14	125	142	428	709
	12 Bellary	517	5	88	245	301	529	1,168
	13 Bijapur	639	73	155	352	172	176	928
	14 Bagalkot	608	24	42	156	131	281	634
	15 Dharwad	455	19	75	149	49	202	494
	16 Gadag	307	2	19	56	38	235	350
	17 Haveri	562		8	171	176	275	630
	18 Belgaum	1,138	6	124	856	392	128	1,506
	Region Total	7,524	284	1,077	3,315	2,054	4,016	10,746
The Southern Plains	19 Davangere	786	1	29	235	176	643	1,084
	20 Chitradurga	932		90	421	153	705	1,369
	21 Tumkur	2,537	149	623	1,563	819	2,330	5,484
	22 Bangalore (U)	681	1	369	301	259	355	1,285
	23 Bangalore (R)	1,713		16	282	1,005	2,091	3,394
	24 Kolar	2,889	35	93	442	220	2,952	3,742
	25 Mandya	1,365	1	139	492	307	934	1,873
	26 Mysore	1,203			253	319	1,362	1,934
	27 Chamarajanagar	446	115	84	407	174	50	830
	Region Total	12,552	302	1,443	4,396	3,432	11,422	20,995
State Total		27,076	1,146	4,412	12,423	8,536	30,165	56,682

ANNEX- VIII

INCIDENCE OF WATER- BORNE DISEASES

Year	Guinea-worm		Cholera		Gastroenteritis		Typhoid	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
4/83 to 12/83								
1983-84	4335		1636	69	10145	605		
1984-85	5232		535	33	6221	330		
1985-86	3372		708	44	6762	348		
1986-87	2754		1253	62	9090	358		
1987-88	2386		1863	86	9348	533		
1988-89	1909		2079	65	13634	608	270	
1989-90								
4/90 to 12/90								
1990-91	634		445	15	7975	357		
1991-92	428		747	15	17455	691		
1/92 to 11/92								
1992-93	166		359	12	11942	486	1161	9
1993-94	18		369	14	31171	714	617	4
1994-95	10		304	10	15932	325	20074	
1995-96	-		532	8	18645	396	17779	10
1996-97	-		657	16	22983	377	2221	12
1997-98	-		741	10	22645	306	2880	5
1998-99	-		434	2	26881	501	8242	4
1999-2000	-		134	3	17743	126	23946	2

ANNEXURE - IX

Rural Water Supply : Karnataka : Habitations Affected with Quality Problems

Region	District	Number of Habitations	Sources tested for Quality			Habitations affected with Quality (QAHs)	% QAHs	Estimated % QAHs
			Number Tested	Number Affected	% Affected			
The Coastal Area	1 Dakshina Kannada	3,137	5539	1171	21.14%	195	6.22%	6.22%
	2 Udupi	3,901						18.13%
	3 Uttara Kannada	5,640						18.13%
	<i>Region Total</i>	<i>12,678</i>	<i>5539</i>	<i>1171</i>	<i>21.14%</i>			
The Malnad	4 Kodagu	573	1185	150	12.66%	64	11.17%	11.17%
	5 Hassan	3,900	773	400	51.75%	123	3.15%	3.15%
	6 Chikkamagalur	3,366	4265	1024	24.01%	342	10.16%	10.16%
	7 Shimoga	4,424						18.13%
	<i>Region Total</i>	<i>12,263</i>	<i>6223</i>	<i>1574</i>	<i>25.29%</i>			
The Northern Plains	8 Bidar	812	2863	981	34.26%	445	54.80%	54.80%
	9 Gulbarga	2,296						18.13%
	10 Raichur	1,219						18.13%
	11 Koppal	709	4011	3802	94.79%	498	70.24%	70.24%
	12 Bellary	1,168						18.13%
	13 Bijapur	928						18.13%
	14 Badalkot	634	677	214	31.61%	62	11.51%	11.51%
	15 Dharwad	494						18.13%
	16 Gadag	350						18.13%
	17 Haveri	630						18.13%
	18 Belgaum	1,506						18.13%
	<i>Region Total</i>	<i>10,746</i>	<i>7551</i>	<i>4997</i>	<i>66.18%</i>			
The Southern Plains	19 Davangere	1,088						18.13%
	20 Chitradurga	1,369						18.13%
	21 Tumkur	5,478	1412	342	24.22%	297	5.42%	5.42%
	22 Bangalore (U)	1,285						18.13%
	23 Bangalore (R)	3,391	8150	2689	32.99%	1158	34.15%	34.15%
	24 Kolar	3,742	6419	3926	61.16%	1668	44.58%	44.58%
	25 Mandya	1,878	2482	326	13.13%	126	6.71%	6.71%
	26 Mysore	1,934						18.13%
	27 Chamarajanagar	830						18.13%
	<i>Region Total</i>	<i>20,995</i>	<i>18463</i>	<i>7283</i>	<i>39.45%</i>			
	<i>State Total</i>	<i>56,682</i>	<i>37776</i>	<i>15025</i>	<i>39.77%</i>		<i>18.13%</i>	<i>18.13%</i>

ANNEX- X

STANDARDS FOR POTABLE WATER PRESCRIBED BY GOI

Constituents (1)	ICMR (Indian Council of Medical Research)		WHO (World Health Organization)	
	Maximum Permissible (2)	Maximum Allowable	Maximum Permissible (3)	Maximum Allowable
1. Turbidity	5.0	25	5	25
2. Colour (Units on Platinum Cobalt Scale)	5.0	25	5	50
3. pH	7.0 to 8.5	6.5 to 9.2	7.0 to 8.5	6.5 to 9.2
4. Total Dissolved Solids(mg/l)	---	---	500	1500
5. Total Hardness(QsCaCO ₃)	300	600	Relaxable to 1000	
6. Calcium (Ca)	75	200	75	200
7. Iron(Fe) in mg/l	0.3	1.0	0.1	0.5
8. Chloride (Cl)	250	1000	250	600
9. Sulphate (SO ₄)	200	400	200	400
10. Fluoride (F)	1.0	2.0	0.5	1.0 to 1.5
11. Nitrates (NO ₃)	20.0	50.0	---	50 to 100
12. Alkalinity	400	---	400	---
13. Conductivity	1500	3000	1500	3000

14 Standards for Bacteriology Quality

(i) Water entering the distribution system

Coliform count in any sample of 100 ml should be zero

(ii) Water in the distribution system shall satisfy all the three criteria below

E-Coli count in 100 ml of any sample should be zero

Coliform organisms not more than 10/100 ml shall be present in any sample

Coliform organisms should not be detectable in 100 ml of any two consecutive samples or more than 50% the samples collected for the year.

(iii) Individual or small community supplies E Coli count should be zero in any sample of 100 ml and coliform organisms should not be more than 3/100 ml

ANNEXURE XI

LIST OF TALUKAS WHERE FLOURIDE TOTAL DISSOLVED
SOLIDS AND NITRATE ARE IN EXCESS OF PERMISSIBLE LIMITS

SL. No.	Name of the District	Name of the Taluk
I	Bangalore (Rural)	1. Ramanagara
II	Belgaum	1. Chikkodi 2. Gokak' 3. Ramadurga 4. Raibag 5. Saundatti
III	Bellary	1. Bellary 2. Kudlagi 3. Siraguppa
IV	Bidar	1. Aurad 2. Basavakalyan
V	Bijapur & Bagalkot	1. Bagewadi 2. Bijapur 3. Hungund 4. Indi 5. Jamakhandi 6. Muddebihal 7. Mudhol 8. Sindagi
VI	Chitradurga & Davangere	1. Challakere 2. Harihara 3. Hiriyur 4. Holalakere 5. Jagalur 6. Molakalmuru 7. Channagiri
VII	Dharwad & Gadag	1. Gadag 2. Kundagol 3. Mundargi 4. Naragund 5. Navalgund 6. Ron 7. Shirahatti

VII	Gulbarga	<ol style="list-style-type: none"> 1. Chincholi 2. Jeevargi 3. Sedam 4. Shapur 5. Shorapur 6. Yadagri
IX	Hassan	<ol style="list-style-type: none"> 1. Arasikere
X	Kolar	<ol style="list-style-type: none"> 2. Kolar 3. Bagepalli 4. Gudibande 5. Chikkaballapur 6. Gowribidanur 7. Malur 8. Mulabagal 9. Siddalaghatta 10. Srinivasapura
XI	Mandya	<ol style="list-style-type: none"> 1. Nagamangala 2. Pandavapura
XII	Mysore	<ol style="list-style-type: none"> 1. Mysore 2. Chamarajanagar 3. Gundlupet 4. Hunsur 5. Kolegal 6. Periyapatna
XIII	Raichur & Koppal	<ol style="list-style-type: none"> 1. Raichur 2. Deodurga 3. Gangavathi 4. Koppal 5. Kustagi 6. Lingasugar 7. Manvi 8. Sindhanur 9. Yelburga
XIV	Tumkur	<ol style="list-style-type: none"> 1. Madhugiri 2. Pavagada 3. Sira

ANNEXURE - XIII

Strategy Paper 2000 -Panchasutra : Details of sample study in Mandya and Mysore Districts for Roads/Lanes

Per Capita Cost of Environmental Sanitation Programme (ESP) - Roads / Lanes										
Different Types of Roads / Lanes :			1. Asphalt		Cost of Construction (Rs per km):				1. Asphalt	550000.00
			2. Maccadam						2. Maccadam	275000.00
			3. By lane		(Rs per mtr)				3. By-lanes	638.00
Sl No	Slice	Village	Population		Road / Lanes (Length in mtrs)				Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	Asphalt	Maccadam	By lane	Total		
1	2	3	4	5	6	7	8	9	10	11
1	MAN-1	Bannagadi	2487	2984	690	1380	230	2300	9.06	303.49
2	MAN-1	Dyavapura	1038	1246	434	867	145	1446	5.70	457.32
3	MAN-1	Govindanahalli	1781	2137	478	956	159	1593	6.27	293.49
4	MAN-1	Hranahalli	1055	1266	543	1086	181	1810	7.13	563.02
5	MAN-1	Hittanahalli	3363	4036	595	1190	198	1983	7.81	193.48
6	MAN-1	Kiragavalu	6811	8173	675	1350	225	2250	8.86	108.41
7	MAN-1	Makavalli	1216	1459	261	522	87	870	3.43	234.79
8	MAN-2	Pattasomanahalli	1938	2326	1627	814	271	2712	12.92	555.38
9	MAN-2	Bevkai	2062	2474	563	1126	188	1877	7.39	298.76
10	MAN-2	Bindenahalli	1468	1762	481	961	160	1602	6.31	358.14
11	MAN-2	Dudda	1779	2135	354	709	118	1181	4.65	217.80
12	MAN-2	Heggadahalli	1296	1555	522	1044	174	1740	6.85	440.59
13	MAN-2	Honnavaara	1876	2251	863	1727	288	2878	11.33	503.43
14	MAN-2	Kalludevanahalli	1174	1409	325	650	108	1083	4.26	302.67
15	MAN-2	Kudagabalu	1039	1247	998	1996	333	3327	13.10	1050.89
16	MAN-2	Muthegere	1311	1573	824	1649	275	2748	10.82	687.85
17	MAN-2	Pala Agrahara	1310	1572	666	1332	222	2220	8.74	556.13
18	MAN-3	B.Hatna	1376	1651	299	597	100	996	3.92	237.66
19	MAN-3	Chandagalu	3727	4472	485	970	162	1617	6.37	142.40

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Per Capita Cost of Environmental Sanitation Programme (ESP) - Roads / Lanes										
Different Types of Roads / Lanes :			1. Asphalt		Cost of Construction (Rs per km):				1. Asphalt	550000.00
			2. Maccadam						2. Maccadam	275000.00
			3. By lane		(Rs per mtr)				3. By-lanes	638.00
Sl No	Slice	Village	Population		Road / Lanes (Length in mtrs)				Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	Asphalt	Maccadam	By lane	Total		
1	2	3	4	5	6	7	8	9	10	11
20	MAN-3	Ganaganur	1045	1254	414	828	138	1380	5.43	433.37
21	MAN-3	Keelara	5774	6929	504	1008	168	1680	6.62	95.48
22	MAN-3	Lingapatna	3064	3677	108	216	36	360	1.42	38.56
23	MAN-3	Marchaknahalli	1422	1706	462	924	154	1540	6.06	355.40
24	MAN-3	Nelamane	2884	3461	1841	3681	613	6135	24.16	698.08
25	MAN-3	Saragur	1915	2298	328	656	109	1093	4.30	187.27
26	MAN-3	Talagavadi	3616	4339	1233	2466	411	4110	16.19	373.00
27	MAN-4	Aralakupe	3877	4652	1705	3410	568	5683	22.38	481.02
28	MAN-4	Bastihalli	1999	2399	570	1139	190	1899	7.48	311.80
29	MAN-4	Javaranahalli	1120	1344	197	393	66	656	2.59	192.36
30	MAN-4	Kadabahalli	1248	1498	988	1976	330	3294	12.97	866.28
31	MAN-4	Kothathi	3828	4594	391	782	130	1303	5.13	111.69
32	MAN-4	Mangala	2616	3139	684	1369	228	2281	8.98	286.10
33	MAN-4	Mullukatte	1572	1886	973	1946	324	3243	12.77	676.96
34	MAN-4	Settapura	2155	2586	635	1269	212	2116	8.33	322.31
35	MAN-5	Bidarakote	2258	2710	768	1536	256	2560	10.08	372.06
36	MAN-5	Chinkurali	3827	4592	302	603	101	1006	3.96	86.31
37	MAN-5	Chunchanahalli	2438	2926	297	994	166	1457	5.43	185.47
38	MAN-5	Gamanahalli	2226	2671	1301	2603	434	4338	17.08	639.51

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Per Capita Cost of Environmental Sanitation Programme (ESP) - Roads / Lanes										
Different Types of Roads / Lanes :			1. Asphalt		Cost of Construction (Rs per km):				1. Asphalt	550000.00
			2. Maccadam						2. Maccadam	275000.00
			3. By lane		(Rs per mtr)				3. By-lanes	638.00
Sl No	Slice	Village	Population		Road / Lanes (Length in mtrs)				Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	Asphalt	Maccadam	By lane	Total		
1	2	3	4	5	6	7	8	9	10	11
39	MAN-5	K,Honnalagere	4007	4808	314	627	105	1046	4.12	85.71
40	MAN-5	Laxmisagara	2501	3001	1154	2309	385	3848	15.15	504.90
41	MAN-5	N.B.Halli	2169	2603	372	744	124	1240	4.88	187.61
42	MAN-5	Navile	1104	1325	254	507	85	846	3.33	251.63
43	MAN-6	Ballekere	1618	1942	570	1140	190	1900	7.48	385.36
44	MAN-6	Hallagere	2866	3439	2090	4180	697	6967	27.44	797.77
45	MAN-6	Lalanakere	1407	1688	251	501	84	836	3.29	195.11
46	MAN-6	Shivapura	1394	1673	533	1065	178	1776	7.00	418.21
47	MAN-7	Acchappankopplu	1085	1302	184	367	61	612	2.41	185.13
48	MAN-7	Bekkalae	2729	3275	447	894	149	1490	5.87	179.17
49	MAN-7	Byaladkere	748	898	149	297	42	488	1.90	212.14
50	MAN-7	Dhagur	4705	5646	1736	3471	571	5778	22.74	402.70
51	MAN-7	SunkaTannur	2435	2922	236	471	79	786	3.10	106.00
52	MAN-8	Kodihalli(phase 2)	5171	6205	3143	6286	1048	10477	41.26	664.91
53	MAN 10	Belagola	12539	15047	595	1189	198	1982	7.81	51.87
54	MAN 11	Kyathanahalli	7959	9551	383	765	128	1276	5.03	52.63
55	MAN 12	Arakere	8200	9840	1293	2587	431	4311	16.98	172.52
56	MYS-1	Bidaragodu	1842	2210	773	1546	258	2577	10.15	459.15
57	MYS-1	Doddakanya	2282	2738	498	936	166	1600	6.37	232.69

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Per Capita Cost of Environmental Sanitation Programme (ESP) - Roads / Lanes										
Different Types of Roads / Lanes :			1. Asphalt		Cost of Construction (Rs per km).			1. Asphalt		550000.00
			2. Maccadam					2. Maccadam		275000.00
			3. By lane		(Rs per mtr)			3. By-lanes		638.00
Sl No	Slice	Village	Population		Road / Lanes (Length in mtrs)				Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	Asphalt	Maccadam	By lane	Total		
1	2	3	4	5	6	7	8	9	10	11
58	MYS-1	Doora	3535	4242	462	925	154	1541	6.07	143.03
59	MYS-1	Haginavalu	3069	3683	882	1764	294	2940	11.58	314.37
60	MYS-1	Kodalapur	2730	3276	1071	2142	357	3570	14.06	429.14
61	MYS-1	Kupparavalli	1158	1390	212	423	71	706	2.78	200.22
62	MYS-1	Siddalingapura	2349	2819	155	310	52	517	2.04	72.26
63	MYS-2	Chidaravalli	2311	2773	1074	2147	358	3579	14.10	508.27
64	MYS-2	Harohalli	649	779	2079	4158	693	6930	27.29	3504.15
65	MYS-2	Hyakanur	2020	2424	1136	2271	379	3786	14.91	615.15
66	MYS-2	Rangasamudra	2631	3157	699	1398	228	2325	9.14	289.61
67	MYS-2	Yachanahalli	1880	2256	485	970	162	1617	6.37	282.29
68	MYS-3	Annur	1322	1586	165	331	55	551	2.17	136.70
69	MYS-3	Anthrasanthe	3488	4186	547	1094	180	1821	7.17	171.19
70	MYS-3	Gerasanahalli	1463	1756	541	1082	180	1803	7.10	404.39
71	MYS-3	Bachegowadanahalli	1189	1427	358	716	119	1193	4.70	329.21
72	MYS-3	Kampalapura	4090	4908	168	337	56	561	2.21	44.99
73	MYS-3	Nagawala	2247	2696	251	502	84	837	3.30	122.27
74	MYS-3	Kaniyanahundi	1296	1555	298	596	99	993	3.91	251.39
75	MYS-4	Doda Kawalande	3168	3802	462	925	154	1541	6.07	159.60
76	MYS-4	Harve	4444	5333	1275	2550	425	4250	16.74	313.84

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Per Capita Cost of Environmental Sanitation Programme (ESP) - Roads / Lanes										
Different Types of Roads / Lanes :			1. Asphalt		Cost of Construction (Rs per km):			1. Asphalt		550000.00
			2. Maccadam					2. Maccadam		275000.00
			3. By lane		(Rs per mtr)			3. By-lanes		638.00
SI No	Slice	Village	Population		Road / Lanes (Length in mtrs)				Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	Asphalt	Maccadam	By lane	Total		
1	2	3	4	5	6	7	8	9	10	11
77	MYS-4	Nagavalli	5628	6754	1129	2257	376	3762	14.82	219.37
78	MYS-4	Nanjadevanapura	2358	2830	1425	2850	475	4750	18.71	661.07
79	MYS-5	Alathur	2000	2400	254	1307	218	1779	6.38	265.92
80	MYS-5	Ankalli	2179	2615	523	1045	174	1742	6.86	262.37
81	MYS-5	Arakalwadi	2428	2914	1085	2169	362	3616	14.24	488.80
82	MYS-5	Hebbasur	4504	5405	707	1413	236	2356	9.28	171.70
83	MYS-5	Honnegowdanahalli	1243	1492	694	1387	231	2312	9.11	610.42
84	MYS-5	Yanaganalli	2423	2908	485	970	162	1617	6.37	219.03
85	MYS-6	Alagodu	5128	6154	1851	3702	617	6170	24.30	394.85
86	MYS-6	Bilaguli	3771	4525	809	1618	270	2697	10.62	234.72
87	MYS-6	Kodgahalli	2715	3258	747	1495	249	2491	9.81	301.05
88	MYS-6	Thayur	2933	3520	1008	2016	336	3360	13.23	375.94
89	MYS-7	Hadanur	2087	2504	600	1200	200	2000	7.88	314.49
90	MYS-7	Hullahalli	7517	9020	3809	7618	1270	12697	50.00	554.32
91	MYS-7	Sindhuvalli	2919	3503	2153	4306	718	7177	28.26	806.89
92	MYS-8	Halaganahalli	2243	2692	786	1572	262	2620	10.32	383.32
93	MYS-8	Kandegala	1035	1242	293	585	98	976	3.85	309.62
94	MYS-8	Kelaganahalli	1304	1565	339	678	113	1130	4.45	284.38
95	MYS-8	Konasur	1778	2134	378	756	126	1260	4.96	232.56

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Different Types of Roads / Lanes :			1. Asphalt		Cost of Construction (Rs per km):				1. Asphalt	
			2. Maccadam						2. Maccadam	
			3. By lane		(Rs per mtr)				3. By-lanes	
Sl No	Slice	Village	Population		Road / Lanes (Length in mtrs)				Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	Asphalt	Maccadam	By lane	Total		
1	2	3	4	5	6	7	8	9	10	11
96	MYS-8	Ravandur	2148	2578	635	1270	212	2117	8.34	323.46
97	MYS-9	Chikkabuvalli	1664	1997	224	448	75	747	2.94	147.36
98	MYS-9	Karagalli	1833	2200	471	941	157	1569	6.18	280.96
99	MYS-9	Menasikyathalli	2486	2983	410	820	137	1367	5.38	180.48
100	MYS-9	P.G.Palya	3487	4184	1241	2481	414	4136	16.29	389.29
101	MYS-9	T.Bettahalli	1763	2116	595	1190	198	1983	7.81	369.08
102	MYS-10	Chamarayanakote	2086	2503	248	495	83	826	3.25	130.03
103	MYS-10	Gowadagere	2984	3581	2155	4302	720	7177	28.28	789.67
104	MYS-10	Kanagal	2327	2792	158	320	52	530	2.08	74.52
105	MYS-11	Adaganalli	1205	1446	597	1195	199	1991	7.84	542.14
106	MYS-11	Chandagal	2764	3317	545	1089	182	1816	7.15	215.67
107	MYS-11	Gandanahalli	4731	5677	1329	2658	443	4430	17.45	307.29
108	MYS-11	Hampapur	3900	4680	780	1560	260	2600	10.24	218.78
109	MYS-11	Kestur	4855	5826	503	1007	168	1678	6.61	113.42
110	MYS-12	Agara	10040	12048	532	1064	177	1773	6.98	57.95
111	MYS-12	Hullepura	1402	1682	430	860	143	1433	5.64	335.37
112	MYS-12	Kestur	5490	6588	2270	4540	757	7567	29.80	452.33
113	MYS-13	Gumbaili	3873	4648	2270	4539	757	7566	29.80	641.12
114	MYS-13	Honganur	6245	7494	523	1046	174	1743	6.86	91.58

ANNEXURE - XIII

Strategy Paper 2000 -Panchasutra : Details of sample study in Mandya and Mysore Districts for Roads/Lanes

Per Capita Cost of Environmental Sanitation Programme (ESP) - Roads / Lanes										
Different Types of Roads / Lanes :			1. Asphalt		Cost of Construction (Rs per km):				1. Asphalt	550000.00
			2. Maccadam						2. Maccadam	275000.00
			3. By lane		(Rs per mtr)				3. By-lanes	638.00
Sl No	Slice	Village	Population		Road / Lanes (Length in mtrs)				Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	Asphalt	Maccadam	By lane	Total		
1	2	3	4	5	6	7	8	9	10	11
115	MYS-13	Jodimellahalli	2703	3244	1029	2057	343	3429	13.50	416.35
116	MYS-13	Vaddagere	1297	1556	240	480	80	800	3.15	202.42
117	MYS-14	Lalitadripura	3114	3737	462	925	154	1541	6.07	162.37
118	MYS-14	Ramanahalli	5356	6427	939	1877	313	3129	12.32	191.73
119	MYS-15	Haleyur	5013	6016	488	975	163	1626	6.41	106.48
120	MYS-15	Halladamanuganalli	1251	1501	371	741	124	1236	4.87	324.37
121	MYS-15	Jakkalli	1471	1765	188	375	63	626	2.47	139.77
122	MYS-15	KatteKavil	1330	1596	949	1897	316	3162	12.45	780.22
123	MYS-15	Marachanahalli	5510	6612	949	1897	316	3162	12.45	188.33
124	MYS-15	Masahalli	1441	1729	223	445	74	742	2.92	169.00
125	MYS-15	Tharikallu	1020	1224	450	900	150	1500	5.91	482.60
126	MYS-15	Thumbasoge	1708	2050	533	1065	178	1776	7.00	341.33
127	MYS-16	Sathegala	9188	11026	2291	4582	764	7637	30.08	272.78
128	MYS-17	Kudlur	4600	5520	602	1205	201	2008	7.91	143.25
129	MYS-17	Palya	5511	6613	687	1374	229	2290	9.02	136.36
130	MYS-18	Jannur	2407	2888	687	1375	229	2291	9.02	312.31
131	MYS-18	Mardur	2390	2868	339	678	113	1130	4.45	155.16
132	MYS-18	Ummathur	4863	5836	1794	3588	598	5980	23.55	403.54
133	MYS-19	Uddurkaval	3095	3714	882	1764	294	2940	11.58	311.73

ANNEXURE - XIII

Strategy Paper 2000 -Panchasutra : Details of sample study in Mandya and Mysore Districts for Roads/Lanes

Per Capita Cost of Environmental Sanitation Programme (ESP) - Roads / Lanes										
Different Types of Roads / Lanes :			1. Asphalt		Cost of Construction (Rs per km):			1. Asphalt		550000.00
			2. Maccadam					2. Maccadam		275000.00
			3. By lane		(Rs per mtr)			3. By-lanes		638.00
SI No	Slice	Village	Population		Road / Lanes (Length in mtrs)				Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	Asphalt	Maccadam	By lane	Total		
1	2	3	4	5	6	7	8	9	10	11
134	MYS-19	Yadakola	3955	4746	212	424	71	707	2.78	58.68
Total			387490	464988	101985	202641	33911	338537	1334.53	287.00
Average Per Village			2892	3470	761	1512	253	2526	9.96	287.00

ANNEXURE - XIV

Strategy Paper 2000 : Panchsutra : Details of Sample Study - Drains

Per Capita Cost of Environmental Sanitation Programme (ESP) - Drains									
Different Types of Drain :			1. V-Shape		Cost of Construction (Rs per mtr):			1. V-Shape	330.00
			2. Box-Shape					2. Box-Shape	935.00
Sl No	Slice	Village	Population		Drain (Length in mtrs)			Estimated Cost (Rs in Lakhs)	Per Capita Cos (Rs) Population 2001
			1991	2001	V-Shape	Box-Shape	Total		
1	2	3	4	5	6	7	8	9	10
1	MAN-1	Bannagadi	2487	2984	1737	745	2482	12.70	425.47
2	MAN-1	Dyavapura	1038	1246	1889	810	2699	13.81	1108.48
3	MAN-1	Govindanahalli	1781	2137	2399	1028	3427	17.53	820.16
4	MAN-1	Hranahalli	1055	1266	2785	1194	3979	20.35	1607.77
5	MAN-1	Hittanahalli	3363	4036	2967	1271	4238	21.67	537.09
6	MAN-1	Kiragavalu	6811	8173	3852	1651	5503	28.15	344.40
7	MAN-1	Makavalli	1216	1459	860	368	1228	6.28	430.29
8	MAN-2	Pattasomanahalli	1938	2326	1644	792	2436	12.83	551.70
9	MAN-2	Bevkai	2062	2474	2193	150	2343	8.64	349.15
10	MAN-2	Bindenahalli	1468	1762	1667	715	2382	12.19	691.78
11	MAN-2	Dudda	1779	2135	1868	809	2677	13.73	643.08
12	MAN-2	Heggadahalli	1296	1555	2166	928	3094	15.82	1017.53
13	MAN-2	Honnavara	1876	2251	3505	52	3557	12.05	535.39
14	MAN-2	Kalludevanahalli	1174	1409	1845	48	1893	6.54	464.03
15	MAN-2	Kudagabalu	1039	1247	177	76	253	1.29	103.84
16	MAN-2	Muthegere	1311	1573	795	341	1136	5.81	369.43
17	MAN-2	Pala Agrahara	1310	1572	2385	52	2437	8.36	531.60
18	MAN-3	B.Hatna	1376	1651	1387	594	1981	10.13	613.55
19	MAN-3	Chandagalu	3727	4472	4358	1868	6226	31.85	712.08

ANNEXURE - XIV

Strategy Paper 2000 : Panchsutra : Details of Sample Study - Drains

Per Capita Cost of Environmental Sanitation Programme (ESP) - Drains									
Different Types of Drain :			1. V-Shape		Cost of Construction (Rs per mtr):			1. V-Shape	330.00
			2. Box-Shape					2. Box-Shape	935.00
SI No	Slice	Village	Population		Drain (Length in mtrs)			Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	V-Shape	Box-Shape	Total		
1	2	3	4	5	6	7	8	9	10
20	MAN-3	Ganaganur	1045	1254	1424	610	2034	10.40	829.56
21	MAN-3	Keelara	5774	6929	3345	1433	4778	24.44	352.69
22	MAN-3	Lingapatna	3064	3677	489	210	699	3.58	97.29
23	MAN-3	Marchaknahalli	1422	1706	1660	115	1775	6.55	384.04
24	MAN-3	Nelamane	2884	3461	5395	190	5585	19.58	565.77
25	MAN-3	Saragur	1915	2298	1680	720	2400	12.28	534.20
26	MAN-3	Talagavadi	3616	4339	5123	2195	7318	37.43	862.58
27	MAN-4	Aralakupe	3877	4652	4800	274	5074	18.40	395.54
28	MAN-4	Bastihalli	1999	2399	2771	1187	3958	20.24	843.87
29	MAN-4	Javaranaahalli	1120	1344	671	287	958	4.90	364.42
30	MAN-4	Kadabahalli	1248	1498	3610	100	3710	12.85	857.91
31	MAN-4	Kothathi	3828	4594	2750	1179	3929	20.10	437.54
32	MAN-4	Mangala	2616	3139	3686	1580	5266	26.94	858.08
33	MAN-4	Mullukatte	1572	1886	1068	458	1526	7.81	413.84
34	MAN-4	Settapura	2155	2586	2528	1083	3611	18.47	714.17
35	MAN-5	Bidarakote	2258	2710	3209	1375	4584	23.45	865.29
36	MAN-5	Chinkurali	3827	4592	2043	875	2918	14.92	324.95
37	MAN-5	Chunchanahalli	2438	2926	1370	587	1957	10.01	342.13
38	MAN-5	Gamanahalli	2226	2671	2771	200	2971	11.01	412.34

ANNEXURE - XIV

Strategy Paper 2000 : Panchsutra : Details of Sample Study - Drains

Per Capita Cost of Environmental Sanitation Programme (ESP) - Drains									
Different Types of Drain :			1. V-Shape		Cost of Construction (Rs per mtr):			1. V-Shape	330.00
			2. Box-Shape					2. Box-Shape	935.00
Sl No	Slice	Village	Population		Drain (Length in mtrs)			Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	V-Shape	Box-Shape	Total		
1	2	3	4	5	6	7	8	9	10
39	MAN-5	K,Honnalagere	4007	4808	1334	572	1906	9.75	202.78
40	MAN-5	Laxmisagara	2501	3001	5615	68	5683	19.17	638.59
41	MAN-5	N.B.Halli	2169	2603	1713	734	2447	12.52	480.86
42	MAN-5	Navile	1104	1325	1144	490	1634	8.36	630.79
43	MAN-6	Ballekere	1618	1942	2531	1085	3616	18.50	952.67
44	MAN-6	Hallagere	2866	3439	6065	132	6197	21.25	617.84
45	MAN-6	Lalanakere	1407	1688	1721	737	2458	12.57	744.51
46	MAN-6	Shivapura	1394	1673	2331	999	3330	17.03	1018.23
47	MAN-7	Acchappankopplu	1085	1302	865	371	1236	6.32	485.66
48	MAN-7	Bekkalae	2729	3275	2134	914	3048	15.59	476.00
49	MAN-7	Byaladkere	748	898	4065	50	4115	13.88	1546.57
50	MAN-7	Dhagur	4705	5646	6064	2599	8663	44.31	784.84
51	MAN-7	SunkaTannur	2435	2922	1119	480	1599	8.18	279.97
52	MAN-8	Kodihalli(phase 2)	5171	6205	13764	5899	19663	100.58	1620.85
53	MAN 10	Belagola	12539	15047	16500	440	16940	58.56	389.21
54	MAN 11	Kyathanahalli	7959	9551	3604	1545	5149	26.34	275.78
55	MAN 12	Arakere	8200	9840	1383	593	1976	10.11	102.73
56	MYS-1	Bidaragodu	1842	2210	2274	975	3249	16.62	751.92
57	MYS-1	Doddakanya	2282	2738	2223	953	3176	16.25	593.28

ANNEXURE - XIV

Strategy Paper 2000 : Panchsutra : Details of Sample Study - Drains

Per Capita Cost of Environmental Sanitation Programme (ESP) - Drains									
Different Types of Drain :			1. V-Shape		Cost of Construction (Rs per mtr):			1. V-Shape	330.00
			2. Box-Shape					2. Box-Shape	935.00
SI No	Slice	Village	Population		Drain (Length in mtrs)			Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	V-Shape	Box-Shape	Total		
1	2	3	4	5	6	7	8	9	10
58	MYS-1	Doora	3535	4242	1940	832	2772	14.18	334.30
59	MYS-1	Haginavalu	3069	3683	2419	1037	3456	17.68	480.03
60	MYS-1	Kodalapur	2730	3276	4435	1901	6336	32.41	989.31
61	MYS-1	Kupparavalli	1158	1390	1528	655	2183	11.17	803.59
62	MYS-1	Siddalingapura	2349	2819	537	230	767	3.92	139.16
63	MYS-2	Chidaravalli	2311	2773	4038	1730	5768	29.50	1063.79
64	MYS-2	Harohalli	649	779	1072	511	1583	8.32	1067.73
65	MYS-2	Hyakanur	2020	2424	5228	2240	7468	38.20	1575.76
66	MYS-2	Rangasamudra	2631	3157	2968	1272	4240	21.69	686.93
67	MYS-2	Yachanahalli	1880	2256	3644	1562	5206	26.63	1180.40
68	MYS-3	Annur	1322	1586	854	366	1220	6.24	393.36
69	MYS-3	Anthrasanthe	3488	4186	2722	1166	3888	19.88	475.07
70	MYS-3	Gerasanahalli	1463	1756	2091	896	2987	15.28	870.24
71	MYS-3	Bachegowadanahalli	1189	1427	2418	1036	3454	17.67	1238.16
72	MYS-3	Kampalapura	4090	4908	1023	438	1461	7.47	152.22
73	MYS-3	Nagawala	2247	2696	1322	566	1888	9.65	358.06
74	MYS-3	Kaniyanahundi	1296	1555	2559	1097	3656	18.70	1202.52
75	MYS-4	Doda Kawalande	3168	3802	1988	852	2840	14.53	382.12
76	MYS-4	Harve	4444	5333	5470	2344	7814	39.97	749.46

ANNEXURE - XIV

Strategy Paper 2000 : Panchsutra : Details of Sample Study - Drains

Per Capita Cost of Environmental Sanitation Programme (ESP) - Drains									
Different Types of Drain :			1. V-Shape		Cost of Construction (Rs per mtr):			1. V-Shape	330.00
			2. Box-Shape					2. Box-Shape	935.00
SI No	Slice	Village	Population		Drain (Length in mtrs)			Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	V-Shape	Box-Shape	Total		
1	2	3	4	5	6	7	8	9	10
77	MYS-4	Nagavalli	5628	6754	4659	1997	6656	34.05	504.13
78	MYS-4	Nanjadevanapura	2358	2830	6159	2639	8798	45.00	1590.31
79	MYS-5	Alathur	2000	2400	2783	1193	3976	20.34	847.44
80	MYS-5	Ankalli	2179	2615	2843	1218	4061	20.77	794.33
81	MYS-5	Arakalwadi	2428	2914	5733	2457	8190	41.89	1437.80
82	MYS-5	Hebbasur	4504	5405	3590	1538	5128	26.23	485.26
83	MYS-5	Honnegowdanahalli	1243	1492	3176	1361	4537	23.21	1555.79
84	MYS-5	Yanaganalli	2423	2908	318	136	454	2.32	79.83
85	MYS-6	Alagodu	5128	6154	9225	3954	13179	67.41	1095.50
86	MYS-6	Bilaguli	3771	4525	2787	1194	3981	20.36	449.95
87	MYS-6	Kodgahalli	2715	3258	4706	2017	6723	34.39	1055.52
88	MYS-6	Thayur	2933	3520	4547	1949	6496	33.23	944.09
89	MYS-7	Hadanur	2087	2504	3572	1531	5103	26.10	1042.26
90	MYS-7	Hullahalli	7517	9020	17604	7545	25149	128.64	1426.09
91	MYS-7	Sindhuvalli	2919	3503	1656	710	2366	12.10	345.53
92	MYS-8	Halaganahalli	2243	2692	2895	1241	4136	21.16	786.03
93	MYS-8	Kandegala	1035	1242	2142	918	3060	15.65	1260.22
94	MYS-8	Keleganahalli	1304	1565	1438	616	2054	10.51	671.33
95	MYS-8	Konasur	1778	2134	2050	878	2928	14.97	701.83

ANNEXURE - XIV

Strategy Paper 2000 : Panchsutra : Details of Sample Study - Drains

Per Capita Cost of Environmental Sanitation Programme (ESP) - Drains									
Different Types of Drain :			1. V-Shape		Cost of Construction (Rs per mtr):			1. V-Shape	330.00
			2. Box-Shape					2. Box-Shape	935.00
SI No	Slice	Village	Population		Drain (Length in mtrs)			Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	V-Shape	Box-Shape	Total		
1	2	3	4	5	6	7	8	9	10
96	MYS-8	Ravandur	2148	2578	3572	1531	5103	26.10	1012.66
97	MYS-9	Chikkabuvalli	1664	1997	1453	623	2076	10.62	531.85
98	MYS-9	Karagalli	1833	2200	2043	875	2918	14.92	678.45
99	MYS-9	Menasikyathalli	2486	2983	1737	745	2482	12.70	425.65
100	MYS-9	P.G.Palya	3487	4184	4270	1830	6100	31.20	745.66
101	MYS-9	T.Bettahalli	1763	2116	2464	1056	3520	18.00	851.05
102	MYS-10	Chamarayanakote	2086	2503	2297	984	3281	16.78	670.36
103	MYS-10	Gowadagere	2984	3581	4100	1600	5700	28.49	795.63
104	MYS-10	Kanagal	2327	2792	1741	755	2496	12.80	458.55
105	MYS-11	Adaganalli	1205	1446	1976	847	2823	14.44	998.63
106	MYS-11	Chandagal	2764	3317	2723	1167	3890	19.90	599.90
107	MYS-11	Gandanahalli	4731	5677	5625	2411	8036	41.11	724.04
108	MYS-11	Hampapur	3900	4680	4113	1763	5876	30.06	642.24
109	MYS-11	Kestur	4855	5826	2277	976	3253	16.64	285.61
110	MYS-12	Agara	10040	12048	2696	1156	3852	19.71	163.56
111	MYS-12	Hullepura	1402	1682	1692	725	2417	12.36	734.80
112	MYS-12	Kestur	5490	6588	4487	1923	6410	32.79	497.68
113	MYS-13	Gumballi	3873	4648	5512	2362	7874	40.27	866.56
114	MYS-13	Honganur	6245	7494	1416	607	2023	10.35	138.09

ANNEXURE - XIV

Strategy Paper 2000 : Panchsutra : Details of Sample Study - Drains

Per Capita Cost of Environmental Sanitation Programme (ESP) - Drains									
Different Types of Drain :			1. V-Shape		Cost of Construction (Rs per mtr):			1. V-Shape	330.00
			2. Box-Shape					2. Box-Shape	935.00
Sl No	Slice	Village	Population		Drain (Length in mtrs)			Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	V-Shape	Box-Shape	Total		
1	2	3	4	5	6	7	8	9	10
115	MYS-13	Jodimellahalli	2703	3244	3557	1525	5082	26.00	801.48
116	MYS-13	Vaddagere	1297	1556	958	410	1368	6.99	449.43
117	MYS-14	Lalitadripura	3114	3737	5515	2360	7875	40.27	1077.54
118	MYS-14	Ramanahalli	5356	6427	8365	3585	11950	61.12	951.02
119	MYS-15	Haleyur	5013	6016	1937	830	2767	14.15	235.26
120	MYS-15	Halladamanuganalli	1251	1501	1786	766	2552	13.06	869.70
121	MYS-15	Jakkalli	1471	1765	1042	446	1488	7.61	431.04
122	MYS-15	KatteKavil	1330	1596	3962	1698	5660	28.95	1813.97
123	MYS-15	Marachanahalli	5510	6612	6741	2889	9630	49.26	744.97
124	MYS-15	Masahalli	1441	1729	1105	474	1579	8.08	467.18
125	MYS-15	Tharikallu	1020	1224	2722	1166	3888	19.88	1624.57
126	MYS-15	Thumbasoge	1708	2050	2981	1278	4259	21.79	1062.97
127	MYS-16	Sathegala	9188	11026	2291	4582	6873	50.40	457.14
128	MYS-17	Kudlur	4600	5520	2540	1088	3628	18.55	336.14
129	MYS-17	Palya	5511	6613	2038	873	2911	14.89	225.12
130	MYS-18	Jannur	2407	2888	6901	2958	9859	50.43	1745.97
131	MYS-18	Mardur	2390	2868	1369	587	1956	10.01	348.89
132	MYS-18	Ummathur	4863	5836	7031	3013	10044	51.37	880.35
133	MYS-19	Uddurkaval	3095	3714	2417	1037	3454	17.67	475.82

ANNEXURE - XIV

Strategy Paper 2000 : Panchsutra : Details of Sample Study - Drains

Per Capita Cost of Environmental Sanitation Programme (ESP) - Drains									
Different Types of Drain :			1. V-Shape		Cost of Construction (Rs per mtr):			1. V-Shape	330.00
			2. Box-Shape					2. Box-Shape	935.00
Sl No	Slice	Village	Population		Drain (Length in mtrs)			Estimated Cost (Rs in Lakhs)	Per Capita Cost (Rs) Population 2001
			1991	2001	V-Shape	Box-Shape	Total		
1	2	3	4	5	6	7	8	9	10
134	MYS-19	Yadakola	3955	4746	5730	2456	8186	41.87	882.27
Total			387490	464988	424642	161566	586208	2911.96	626.24
Average Per Village			2892	3470	3169	1206	4375	21.73	626.24

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ANNEXURE XV

COST OF RURAL SANITATION

TYPICAL HABITATION OF 2500 POPULATION OR 500 HOUSEHOLDS)

SL No	Item	Quantity/ Rate	Cost per Village (Rs.in lakhs)	Cost per capita (Rupees)	Cost for 6000 villages (Rs.in crores)
1.	Roads/Street/ Lane paving	2 Kms @ Rs.5.00 lakhs	10.00	400	600
2.	Drains	3.75 Kms @ Rs.	12.50	500	750
3.	Household Latrines	250 latrines @ Rs.1600 average subsidy	4.00	160	240
4.	Improved Chulhas	500 Chulhas @ Rs.100 subsidy	0.50	20	30
5.	Community Latrines	10x3 units @ Rs.3300x10	1.00	40	60
6.	School Sanitation	1 School with toilets & water supply	1.00	40	60
7.	Community Compost Yards	2 Units. @ Rs.25,000	0.50	20	30
8.	I.E.C. and Institutional support	Per village	0.50	20	30
TOTAL			30.00	1200	1800