Sector Status Study of Rural Water Supply and Sanitation

in

Karnataka





DRAFT FINAL REPORT Sector Status Study Team, Bangalore February, 2006

ABBREVIATIONS

ANSSIRD	 Abdul Nazir Sab State Institute of Rural Development
APL	- Above Poverty Line
ARWSP	 Accelerated Rural Water Supply Program
BPL	- Below Poverty Line
CBM	- Capacity Building Measures
CCDU	 Communication and Capacity Development Unit
CDD/WatSan	- Control of Diarrheoral Diseases/Water and Sanitation
CEO	- Chief Executive Officer
CGWB	- Central Ground Water Board
Danida	- Danish International Development Agency
DWCD	 Department of Women and Child Development
ESA	- External Support Agencies
FC	- Fully Covered
GLSR	- Ground Level Storage Reservoir
Gol	- Government of India
GoK	- Government of Karnataka
GP	- Gram Panchayat
GS	- Gram Sabha
HP	- Hand Pump
HRD	- Human Resource Development
HUDCO	- Housing and Urban Development Corporation
IEC	- Information, Education and Communication
IRWESP	- Integrated Rural Water Supply and Environmental Sanitation
Project	
JRY	- Jawahar Rozgar Yojana
JSYS	- Jal Samvardhan Yojana Sangha
KRWSSA	 Karnataka Rural Water Supply and Sanitation Agency
LPCD	- Liters per Capita per Day
MCM	- Million Cubic Meters
MWS	- Mini Water Supply
NC	- Not Covered
NGY	- Nirmal Gram Yojana
OECF	- Overseas Economic Cooperation Fund (of Japan)
O & M	- Operation and Maintenance
OHT	- Over Head Tank
PHED	- Public Health Engineering Department, Government of Karnataka
PPMU	- Project Planning and Monitoring Unit
PRED	- Panchayati Raj Engineering Department, Government of Karnataka
PWS	- Piped Water Supply Scheme
RD & PR	- Rural Development and Panchayat Raj, Government of Karnataka
RDED	- Rural Development Engineering Department
RGNDWM	- Rajiv Gandhi National Drinking Water Mission
RWSS	- Rural Water Supply and Sanitation
SGRY	- Sampoorna Grameen Rozgar Yojana

SGY	- Swachha Gram Yojana
TP	- Taluk Panchayaths
TSC	- Total Sanitation Campaign
UNICEF	- United Nations International Children's Emergency Fund
VWSC	 Village Water Supply and Sanitation Committee
WES	- Water and Environmental Sanitation
WQM	- Water Quality Monitoring
ZP	- Zilla Panchayath

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Chapter I

INTRODUCTION

1.1 Background

In the process of moving forward from the Sector Reforms Program (SRP) to *Swajaldhara,* the Government of India, though the Rajiv Gandhi National Drinking Water Mission (RGNDWM), is planning to redefine its relationships with the various states of India in the Rural Water Supply and Sanitation Sector. The Government of India (Gol) proposes to enter into a Memorandum of Understanding (MOU) with the Government of Karnataka (GoK) and other states as well, to define new relationship, and requires that state governments reformulate a state specific strategy, while committing itself to adhere to the certain core principles of reforms in the sector. Further, as a part of signing a MOU, states are required to formulate a Vision Statement and Policy for the Rural Drinking Water Supply and Sanitation (RWSS) sector.

For this, the Gol has expressed that the state governments should carry out an assessment of the current status of the sector within the state. On behalf of GoK, the KRWSSA has proposed to undertake the sector status study of RWSS in Karnataka. For the purpose, Danida has agreed to support the financial aspects the study.

The major purpose of the proposed study is to obtain a comprehensive and "realistic" assessment of the sector status by developing and updating the available status data. Further, it is expected that the study outputs would contribute towards the formulation of sector vision in lieu of the transitions at GoK and Gol policy levels. It is envisaged that as the major outcome of the "Sector Assessment Study" the KRWSSA/GoK would be in a position to develop the vision statement for the Rural Water Supply and Sanitation Sector in the State of Karnataka.

2 **Objectives of the Study**

The key objectives of the study are:

- To comprehensively review and prepare the current status of rural water supply and sanitation sector in Karnataka by assessing and carrying out thorough analysis of the data and information available within the sector across the state in concurrence with the RGNDWM/GoK guidelines.
- ii. To assess the critical gaps in implementation of key programs and assess effectiveness of various program delivery mechanisms and analyze the trend of WSS since the introduction of the reform initiatives. At micro level, this may include issues like project management, delivery mechanisms, institutional mechanism, roles and responsibility of major stakeholders, financial flow, reform initiatives etc.
- iii. To provide basic inputs to GoK/KRWSSA in development of its vision document on RWSS sector by eliciting the views of stakeholders on rural water supply and sector management, specifically incorporating the issues of overall sustainability.

1.3 Methodology for Undertaking the Study

The basic approach followed for the sector assessment study includes the following:

- Review and analysis of secondary data/information to assess sector status
- Sample studies to identify, assess and analyze priority issues concerning RWSS sector. The samples to represent variations in agro-climatic and hydro-geological situations within the state of Karnataka.
- Consultations with a spectrum of concerned stakeholders (government officials, elected representatives, community, VWSSC, PRIs etc.) to have their feedback and suggestions in improving RWSS sector
- Analysis of primary and secondary data to suggest reforms improvements, while integrating local management solutions with best management practices from other states, districts, GPs etc.,

1.3.1 Methodology of data collection

To make the sector assessment, both secondary data/information and primary data have been collected.

Secondary data

These are mainly based on available documents and focuses on:

- i. Current status of implementation of rural water supply and sanitation programs in Karnataka (update to March 2005)
- ii. Reforms programs in related sectors and its relevance to RWSS
- iii. Critical policy and institutional reforms that can speed up delivery ensure sustainability of rural water supply and sanitation initiatives
- iv. Role of different stakeholder departments in forming policies, program design and their current capacity to play their roles and responsibilities besides building relationships
- v. Role of Sate, Panchayat Raj Institutions, Village Water Supply and Sanitation Committees in planning, implementation and management of water supply and sanitation facilities including decentralization issues
- vi. Guidelines for identifying and serving poor, un-served communities, vulnerable groups in the communities and for integration of gender issues
- vii. Acts (Panchayati Raj act, GW and Water related acts, rules, office orders etc.)
- viii. Water resource management policies at state level and its interlinkages
- ix. Financial and Investment planning patterns in RWSS sector and physical progress
- x. Project implementation mechanism institutional, community and women's participation, planning, IEC, engineering, management, sustainability, approval process etc. – related to all ongoing and completed projects with focus on reform initiatives and funding support
- xi. Water and health/disease related data
- xii. Lessons learned- Case studies

For the purpose, documents/reports provided by KRWSSA, other concerned agencies and e-information from available web pages of various government

departments and other concerned organizations have been reviewed. A list of such sources is presented in *Annexure I.*

Primary data

The study focuses basically on secondary data. However, to assess few critical issues like community contribution, community participation, gender integration, behavioral patterns, efficacy of institutional mechanism, O&M issues etc., it is very essential that available secondary data are supplemented/corroborated with primary data. Therefore, following techniques have been used for primary data collection:

Structured questionnaire for assessing community perceptions at community/GP levels. In view of this structured questionnaires were prepared and administered (Please refer Annexure 1.1). The primary data focuses on organization and functioning of elected bodies (for RWSS) in relation to existing acts, perception and feedback from stakeholders on critical issues like quality and quantity of water supply, O&M issues, issues in community contributions, equity in distribution, reliability of water supply besides coverage and uses of latrines. This has been assessed for different social classes (including vulnerable groups like SC, ST, BPL families etc.). A separate set of questionnaires (Annexure 1.2 to 1.4) have been prepared to assess the role of community and women in the project cycle, functioning of community based organizations like VWSSC with reference to PR Act/policy awareness, book keeping, data management, technical, managerial and financial capabilities, besides efforts on capacity building and regarding the sustainability of such community based organizations (VWSCs etc).

For administration of structured questionnaire, selective stratified sampling technique has been used to select "representative" sample villages from the state to include following variations:

- Agro-climatology (Hilly, Dry, Coastal, and transitional),
- Geo-morphology,
- Sector reforms
- Bilateral and multilateral funding projects (WB, Danida, Dutch, GoK)
- Water quality (good potable, manageable, with quality problems)
- Empowerment (VWSCs, NGOs, CBOs)

Based on discussions with KRWSSA officials and amongst the consultants, seven districts, as presented in Table 1.1 have been identified for field observations as well as for primary data collection. From each district primary data collection have been done by selecting three villages based on the "specified criteria". From the village about 10% households have been surveyed to assess community perceptions. Discussions were held with VWSC members, Secretary of the GP etc. While sampling, specific considerations have been provided to the inclusion of vulnerable groups (SC, ST, Women headed households and BPL families).

For administration of the questionnaires, fourteen evaluators (two from each district) were provided one day training at KRWSSA, Bangalore. Under the training the objective of data collection, methodology etc. were described. Later, the content

SI No	District	Agro-ecology	Criteria for Sample studies		
1	Mysore	Transitional zone	World Bank Pilot, Phase 1, Phase 2 Successful Implementation of NGY and School Sanitation, Sector Reform Pilot, Capital Cost Sharing, Transitional zone		
2	Kolar	Dry Zone	Danida, Water scarce, Water Quality		
			Dry zone		
3	Dharwad	Dry Zone	Dutch, WB phase II, Multiple Village Scheme		
			Dry Zone		
4	Dakshin Kannada	Coastal	World Bank pilot, Phase 1, Sector Reforms, Capital Cost Sharing, Good Tariff Collection, Good O&M, Total Sanitation, Coastal		
5	Gulbarga	Dry, Transitional	World bank Pilot, Phase I, Phase 2,		
			Transitional and Dry, Water Quality Problem, Backward		
6	Raichur	Dry Zone	WB phase I, WQ Problem, Multiple Village Scheme		
			Dry		
7	Chika-maglur	Dry, Transitional	GoK Programs only, No ESA Programs,		
			Hilly, Transitional and Dry		
** All at	ove districts ar	e also covered un	der TSC		

Table 1.1: Selected Districts for Field Studies and their Selection Criteria

and intent of each individual question in the questionnaire was discussed and clarified. The major purpose of this exercise was to remove any ambiguities in the questionnaire. About 680 structured questionnaires were administered in the selected villages.

Interviews at Policy and Strategic Levels (senior government officials of KRWSSA, concerned agencies, elected representatives etc.): Besides the structured questionnaires interviews with senior officials across the government departments have been conducted to have their views on RWS policy, status of RWS and on overall project management, role and responsibility status etc. This has provided the perceptions and vision of elected representatives and government officials.

Observation Visits: The field visits were carried out to selected villages/habitations. Transect walks, observations, discussions with village level functionaries, and FGDs have been used as tools during the visit to have data/information. A total of 34 villages in seven districts were visited to have assessment of the current status of

- Water Supply supply level, population coverage, accessibility, reliability, equity issues with special emphasis on social groups
- Development activities carried out by different agencies and their status
- Institutional setup and linkage (including governmental, NGOs as well as CBOs) - GP level
- Functioning of VWSSC and O&M management
- Level of community participation in WS scheme and capital cost sharing

- Present status of O&M (policy, management, financial recovery, scheme sustainability etc.)
- Financial allocation and utilization GP/ZP level
- Sanitation in terms of use and coverage of latrines, present status, status of smokeless *chulhas*, biogas plants etc,
- General health scenario

Checklists have been used for the purpose of discussions and recording observations.

Stakeholder Workshop: The consultative workshop is intended to provide feedback on stakeholder perceptions on RWS especially on existing policy, reforms and legislation, institutional mechanism, limitations in effective RWS projects, capital cost sharing etc. The analysis of discussions of the workshop shall be used in development of a roadmap for the "Vision Document of GoK".

1.4 Data Analysis for Sector Status

Both primary (response from questionnaire) and secondary data/information have been analyzed for assessing and supplementing the field observations. The major emphasis has been on secondary data. The limited primary data were coded and analyzed using standard statistical software to provide both regional variations as well as social variations. Further, the data/information and responses from discussions and field observations have been integrated to develop the present status of rural water supply and sanitation in the state of Karnataka and for providing inputs for the vision of the state on RWSS sector as required by the Gol.

The selection has been able to bring out temporal variations in water availability, service levels etc as well as major considerations in planning and management of reliable water supply and well managed sanitation facilities - in terms of quantity and quality of supply, timings, regularity and overall dependability, constraints in "regular" water supply (power, source sustainability, management, breakdowns, technical designs etc.). The other major feature of such an analysis has been to identify constraints in project cycle (structural, financial or field level). The structural constraints include organizational responsibilities and capacities, linkages with their organizations, decision making processes within the organization besides political decisions. At project implementation level it includes capital cost sharing, IEC, technological options, source sustainability etc.

1.5 Inputs for Vision Document

Once data analysis for sector assessment is completed, the next major effort would be to provide inputs, guidelines and road map for the development of Vision document of GoK. This could seek improvements in key focus areas including planning, fund allocation, cost sharing and recovery, delivery mechanism, service levels, water use, role and linkages amongst various agencies including new roles, capacity building etc. This analysis would be inline with GoI requirements for signing of a MOU with GoK.

To overcome the bottlenecks in the present system an effort would be made to seek feasible and adaptable solutions to such constraints. The same could then be integrated and used as inputs for the Vision document of GoK. This analysis would be based on assessment of the following:

- i. Status and impact of reform initiatives in projects implemented with support from ESA (bilateral, multilateral)
- ii. A reflection on the vision of GoK and State Water Policy in the implementation of RWSSP and its relevance with the approach suggested by Gol
- iii. Water resource evaluation (source sustainability) specific to the sector; basin wise/agro-climatic situation wise spatial distribution of rainfall, surface and ground water and its allocations in the light of drinking water security at village habitation levels
- iv. Operation and Maintenance: Participation, institutional setup, community drives, system of water tariff mechanism and status f payment by users, state of installations i.e transfer of assets to GP/VWSCs, related impending issues and its impact on level of involvement of GP and VWSCs
- v. Institutional arrangements; Inter department linkages, role of PRIs, manpower and its development, information management and gaps, maintenance and local drives, linkages with traditional government departments and the status of sector information management system (SIMS)
- vi. Experiences of other sector studies in the country
- vii. Case studies from within and outside states on managing specific and integrated solutions

After careful analysis, best management practices, which could be replicated with local adaptation, would be suggested for integration and policy development. Overall, the sector assessment would provide the basis for GoK to enter an MOU with GoI as well as the required inputs for developing the vision document of GoK on RWSS sector.

1.6 Assumptions

The basic premise of the study was the shared ownership and understanding of the study process by both the client (KRWSSA) and the consultants. Since Karnataka had a rich experience of reforms as well as effective fiscal and administrative decentralization of powers to Panchayati Raj Institutions, a much stronger role for PRIs was envisaged in planning and implementation.

7 **Team Composition**

The study has been conducted by a team of experts with different specializations. The Table 1.2 presents the names of various experts and their specialization.

SI. No.	Name of Expert	Specialization
1	Dr C.P. Bohra	Institutional, Team Leader
2	Dr K Balachandra Kurup	Social and Community Development
3	Ms Anu Sharat	Gender, Hygiene
4	Mr Subhash Mittal	Finance
5	Mr K. Janardhan Rao	Legal, Administration
6	Mr K.H. Achar	Technology
7	Dr Y. Lingaraju	Hydro-geology

 Table 1.2 Team Compositions and Expertise

Chapter II

Background of Karnataka State

The state of Karnataka is the eighth largest state of India in terms of both area and population. While one of its urban centers like Bangalore is internationally recognized as the hub of Information Technology, yet in development attainments the state is at median level in various sectors. On rural front, the state can be distinguished by its large number of scattered rural habitations with heavy dependence on agriculture and allied activities; comparatively poor rural infrastructure like roads, electricity, housing, sanitation etc.; low levels of literacy, health services and skill endowments as compared to its urban counterparts. However, any effort to improve these services require a good understanding of its demography, physiography, agro-climatic conditions besides industrial activities etc. The factors have a strong bearing on rural drinking water supply and sanitation sector development and therefore a brief description of these has been considered necessary. The details of the relevant features of the state are presented in the following sections.

2.1 General Status of Karnataka State

2.1.1 Physical Profile of Karnataka

Karnataka lies in the southwestern part of India covering an area of 1,91,791 sq. km, which is about 5.83% of the area of the county. This constitutes about 187,521 sq. m of rural areas, which is about 97.8% of the area of the state. The state lies between 11° 35' – 18° 29' N latitude and 74° 05' – 78° 34' E longitude. The state is divided into four distinct physiographic regions; the coastal areas, western *Ghats,* northern m*aidan* and southern m*aidan*. It is surrounded by Andhra Pradesh on northern and northeastern side, Tamilnadu on South eastern side, Kerala on southwestern side and Maharashtra and Goa on the Northwestern end and Arabian sea on its Western side.

Administratively, the state of Karnataka has been divided into four divisions namely Bangalore, Mysore, Belgaum and Gulbarga. These division administer 27 Districts of Karnataka namely, Bagalkot, Bangalore (Rural), Bangalore (Urban), Belgaum, Bellary, Bidar, Bijapur, Chamrajanagar, Chikmagalur, Chitradurga, Dakshina Kannada, Davanagere, Dharwad, Gadag, Gulbarga, Hassan, Haveri, Kodagu, Kolar, Koppal, Mandya, Mysore, Raichur, Shimoga, Tumkur, Udupi and Uttara Kannada. These districts covers 175 taluks, 270 towns and 56,882 habitations, which consist of 27,066 revenue villages and 29,616 hamlets and extensions (thandas). The district-wise number of villages/habitations in Karnataka is presented in Annexure 2.1, which indicates that there are a total of 56,682 habitations in the state, whereas, Fig 2.1 shows administrative boundaries of 27 districts of Karnataka.

2.1.2 Demography

As per the 2001 census, the state of Karnataka had a population of 5.29 crores. Of this, rural population was 3.48 crores and the urban population was 1.79 crores. Table 2.1.presents the population growth as well as its distribution in rural and urban areas during last 40 years. It can be observed that that the decennial growth declined over the last three decades. During 1961-71 it was 24.2%, which increased to 26.75% (1971-81) and then finally declined to 17.25% (1991-2001). However, the decadal rural population growth has constantly declined from 21.0% (1961-71) to 12.0% (1991-2001) during last four decades.

Year	Urban Population		Rural Population		Total Population lakhs
	Population, lakhs	% of total	Population, lakhs	% of total	

Table 2.1: Population Growth and Distribution in Karnataka

1961	52.66	22.3	183.2	77.7	235.86
1971	71.22	24.3	221.77	75.7	292.99
1981	107.30	28.9	264.06	71.1	371.36
1991	139.08	30.9	310.69	69.1	449.77
2001	17920	34.0	348.14	66.0	527.34

Source: Census of India, 2001

This population rise has caused the population density in the state to rise to 275 person/sq. km (2001) from 123 persons/sq.km. (1961). However, during the same period, the rural population density has increased at much slower pace i.e. from 97 to 1 86 persons/sq.km.

From gender considerations, the sex ratio (number of females for every 1000 males) in Karnataka, with marginal variations, has nearly remained constant all throughout these forty years. Contrary to all India figures, it has shown a slight improvement over the four decades i.e. from 959 to 964. Whereas, it has shown marginal improvement in rural areas (973 to 976), it has shown marked improvement in urban areas (913 to 940), with a marked improvement in last 10 years (930 to 940). The state wise changes in sex ratio are presented in Table 2.2, whereas district wise population distribution, population growth, sex ratio etc. are provided in **Annexure 2.2**.

Year	Urban	Rural	Total
1961	913	973	959
1971	913	971	957
1981	926	978	963
1991	930	973	960
2001	940	976	964

 Table 2.2
 Sex Ratio in Rural and Urban Areas of Karnataka

Source: Census of India, 2001

2.1.3 Climate

From climatic considerations, the state lies in the tropical zone. Being in northern hemisphere, lower temperatures are observed in the months of December and January with January being the coldest period, whereas April and May are the hottest months. The mean daily temperatures in the state varies from 31°C to 32°C in coastal areas as compared to 24°C to 27°C in the *Ghats*. In the *maidan* areas it varies from 27°C to 30°C. During the month of May, the daily temperature peaks to about 40°C in *Bellary, Bidar* and *Gadag,* whereas it reaches about 43°C in *Gulbarga* and *Raichur*. Overall, the state shows wide variations in the temperature regime.

Similarly, the average annual normal rainfall of the state is 1138 mm spread over an average of 55 rainy days. It varies from as low as 569 mm in the eastern parts of the state to as high as 4029 mm in the western parts of the state. About 70% of the annual rainfall is received during south-western monsoon period, about 17% during north-east monsoon period, 12-13% during post-monsoon periods and about 1% as winter rains.

2.1.4 Soils

Karnataka State forms a part of Deccan Plateau. The soils are mainly derived from Granites, Gneisses and Basalts. Besides these, some part is having Lateritic and Alluvial Soils. The major soils found are Black Cotton Soils, Black Soils, Red Soils, Reddish Brown Soils, Lateritic Soils and Coastal Alluvial soils. The black cotton soils seem to be transported soils found in parts of Belgaum, Dharwad, Gadag, Haveri, Bijapur, Bagalkote, Gulbarga, Bellary and Raichur districts. The black soils derived from Deccan Traps/Basalts are found in parts of Belgaum, Bijapur, Gulbarga and Bidar districts. The red and reddish brown soils derived from Granites and Gneisses are spread over Chitradurga, Haveri, Tumkur, Shimoga, Chikkamagalu, Bangalore Urban and Rural, Kolar, Mandya, Mysore, Hassan and Chamrajanagar districts. The lateritic soils are found in hilly as well as coastal zones. They are also found in patches in Bidar, Bangalore, and Kolar districts. The coastal alluvial soils are found in coastal belt of Uttara Kannada, Udupi and Dakshina Kannada districts.

2.1.5 Geology

Geological Map of Karnataka is shown in fig. 2.2.

2.1.5 Agro-climatic Zones

Based on the climate, rainfall, topology, soil, availability of water, cropping pattern and other agro-meteorological characteristics the country has been divided in to 15 agro-climatic zones and Karnataka State comes under the zones IX, X and XII, i.e., the Western Plateau 7 Hill Region (IX), the Southern Plateau & Hill Region (IX) and the West Coast Plain & Region.

The Karnataka State has further been divided into ten different Agro-climatic zones based on the climate. They are, (i) Northeastern Transition Zone, (ii) Northeastern Dry Zone, (iii) Northern Transition Zone, (iv) Central Dry zone, (v) Eastern Dry Zone, (vi) Southern Dry Zone, (vii) Southern Transition Zone, (viii) Northern Transition Zone, (ix) Hilly Zone, and (x) Coastal Zone (Fig 2.3).

Northeastern transition Zone: This zone covers the Bidar district, Aland and Chincholi taluks of Gulbarga district. In the zone average annual rain fall varies from 850-950mm and the annual average minimum and maximum temperatures range from 20-22° C and 31-32°C respectively. The minimum and maximum Potential Evapo-Transpiration (PET) for this zone is 109 mm and 217mm respectively.

Northeastern Dry Zone: This zone covers the Gulbarga, Afzalpur, Chithapur, Sedam, Jevargi, Shapur, Shorapur and Yadgir *taluks* of Gulbarga district and Raichur; Manvi and Deodurg *taluks* of Raichur district. This zone receives average annual precipitation of the range of 600 to 700 mm with average annual minimum and maximum temperatures of 21-23°C and 32-34°C respectively. The minimum and maximum Potential Evapo- Transpiration (PET) for this zone is 117 mm and 235 mm respectively.

Northern Dry Zone: This zone consists of Indi, Sindhagi, Bijapur, Basavan Bagewadi, Muddebihal *taluks* of Bijapur district; Jamkhandi, Mudhol, Bilgi, Bagalkote, Badami, Hunugund *taluks* of Bagalkote district; Lingsugur and Sindhanur *taluks* of Raichur district; Bellary, Siriguppa, Hospet, Sandor, Hagari Bommanahalli *taluks* of Bellary district; Koppal, Yalburga, Kustagi, Gangavati *taluks* of Koppal district; Gadag, Mundargi, Ron, Nargund *taluks* of Gadag district; Ramdurg, Raibag, Gokak, Athani *taluks* of Belgaum district and Navalgund *taluk* of Dharwad district. This zone experiences an annual average rainfall of 800-1000 mm and annual average minimum and maximum temperatures of 18-20°C and 31-33°C. The minimum and maximum Potential Evapo- Transpiration (PET) for this zone is 104 mm and 224 mm respectively.

Central Dry Zone: The Central Dry Zone comprises of Kudligi, Huvina Hadagali *taluks* of Bellary district, Davanagere, Harihara, Jagalur, Harapanahalli *taluks* of Davanagere districts,

Challakere, Chitradurga, Molakalmur, Holalkere, Hosadurga, Hiriyur *taluks* of Chitradurga district, Sira, Chikkanayakanahalli, Pavagada, Madhugiri, Tiptur, Koratagere *taluks* of Tumkur district, Arasikere *taluk* of Hassan district and Kadur *taluk* of Chikkamagalur district. This zone receives an average annual rainfall of 600-800 mm and annual average minimum and maximum temperatures of 18-20°C and 29-31°C. The minimum and maximum Potential Evapo- Transpiration (PET) for this zone is 104mm and 195 mm respectively.

Eastern Dry Zone: This zone covers the Gauribidanur, Gudibande, Bagepalli, Chikkaballapur, Shidlagatta, Kolar, Chintamani, Srinivasapura, Mulbagal, Malur and Bangarpet *taluks* of Kolar districts and Bangalore North, Bangalore south and Anekal *taluks* of Bangalore Urban district and Gubbi and Tumkur *taluks* of Tumkur district and Hoskote, Devanahalli, Doddaballpur, Nelamangala, Magadi, Ramanagaram, Channapatna and Kanakpura *taluks* of Bangalore district. In the zone average annual rainfall varies from 670-890 mm and annual average minimum and maximum temperatures of 17-20°C and 32-34°C respectively. The minimum and maximum Potential Evapo- Transpiration (PET) for this zone is 98 mm and 166 mm respectively.

Southern Dry Zone: This zone covers Turuvekere and Kunigal *taluks* of Tumkur district, Channarayapatna *taluk* of Hassan district, Nelamangala, Maddur, Mandya, K.R.Pet, Srirangapatna, Padavapura, Malavalli *taluks* of Mandya district, Mysore, K.R.Nagar, Nangangud, T.Narasipura *taluks* of Mysore district and entire Chamrajnagar district. In the zone average annual rainfall varies from 650-850 mm and annual average minimum and maximum temperatures of 18-20°C and 29-31°C respectively. The minimum and maximum Potential Evapo- Transpiration (PET) for this zone is 106 mm and 166 mm respectively.

Southern Transition Zone: This zone consists of H.D. Kote, Hunsur, Piriyaptna *taluks* of Mysore district, Belur, Alur, Hassan, Arkalgud, Holenarasipura *taluks* of Hassan district, Tarikere and Chikkamagalur *taluks* of Chhikkamagalur district, Bhadravati, Shimoga, Shikaripura taluks of Shimoga districts, Channagiri, and Honnali *taluks* of Davanagere districts. This zone experiences an annual average rainfall of 800-1000 mm and annual average minimum and maximum temperatures of 18-19°C and 29-32°C. The minimum and maximum Potential Evapo-Transpiration (PET) for this zone is 95 mm and 157 mm respectively.

Northern Transition Zone: This zone covers the Shirahatti *taluk* of Gadag district, Savanur, Shiggaon, Hanagal, Haveri, Byadgi, Hirekerur, Ranibennur *taluks* of Haveri district, Hubli, Dharwad, Kundagol, Kalgatgi taluks of Dharwad district and Bailhongal, Belgaum, Sauvadatti, Khanapur, Chikkodi, Hukkeri *taluks* of Belgaum district. This zone receives an average annual rainfall of 500-1200 mm and annual average minimum and maximum temperatures of 18-20°C and 30-32°C. The minimum and maximum Potential Evapo-Transpiration (PET) for this zone is 90 mm and 165 mm respectively.

Hilly Zone: The Hilly Zone comprises of Supa, Haliyal, Mundgod, Yellapur, Sirsi, Siddapur *taluks* of Uttara Kannada district, Sagar, Sorabha, Hosanagara, Thirthahalli *taluks* of Shimoga district, Koppa, Narasinharajapura, Sringeri, Mudigere *taluks* of Chikkamagalur district, Sakaleshpur *taluk* of Hassan district and entire Kodagu district. This zone receives an average annual rainfall of 3000-3200 mm and annual average minimum and maximum temperatures of 16-18°C and 26-28°C. The minimum and maximum Potential Evapo-Transpiration (PET) for this zone is 80 mm and 140 mm respectively.

Coastal Zone: The Coastal Zone consists of Ankola, Karwar, Kumuta, Honnavar, Bhatkal *taluks* of Uttara Kannada district, Kundapur, Udupi, Karkala *taluks* of Udupi districts and Mangalore, Bantwal, Belthangadi, Puttur, Sulya *taluks* of Dakshina Kannada district. This zone receives an average annual rainfall of 3100-3400 mm and annual average minimum

and maximum temperatures of 22-24°C and 30-32°C. The minimum and maximum Potential Evapo- Transpiration (PET) for this zone is 90 mm and 140 mm respectively.

2.2 Water Potential of Karnataka

2.2.1 River Basins of Karnataka

Karnataka has seven river systems which have differently sized drainage area with varied rainfall and agro-climatic conditions as presented in Table 2.3. The largest river basin is Krishna river basin, which has a drainage area of 113,27 thousand sq.km in Karnataka and the smallest basin being Palar river basin with only 2.97 thousand sq.km spread in the state.

The east flowing rivers are inter-state rivers, water of which is mainly used for irrigation. Water from the west flowing rivers is mainly used for power generation and irrigation. A drainage map of the state is presented as Fig 2.4.

SI. No.	River System	Drainage Area within Karnataka	Area	
		'000 Sq. km	Percentage	
1	Krishna	113.27	54.46	
2	Cauvery	34.27	17.99	
3	Godavary	4.41	4.31	
4	West Flowing Rivers	24.25	12.73	
5	North Pennar	6.94	3.64	
6	South Pennar	4.37	2.29	
7	Palar	2.97	1.56	
	Total	190.50	100.00	

 Table 2.3
 River Systems and their Drainage Area in Karnataka

Source: Irrigation in Karnataka 2003-2004, Water Resource Development Organization, GoK

2.2.2 Water Yield

The west coast and the western *ghat* region receive higher rainfall than southern and northern plain regions. A substantial part of this rainfall is stored as surface water, part gets percolated down as ground water and the rest gets evaporated into the atmosphere The rainfall so distributed is estimated to yield 97,352 million cu.m. or 3438 TMC storage as presented in Table 2.4.

SI. No.	River System	Estimated Annual Average Yield at 50% dependability			
		Thousand Million cu. M.	Trillion Cu Ft	%	
1	Krishna	27,451	969.44	28.20	
2	Cauvery	10,980	387.76	11.28	
3	Godavary	1,415	49.97	1.45	
4	West flowing Rivers	56,600	1998.83	58.14	
5	North Pennar	906	32.00	0.93	
6	South Pennar				

7	Palar			
	Total	97,352	3438.00	100.00

Source: Water Resource Development Organization

3. Water Consumption

There seems to be lack of consolidated information at the state level on the consumption of water across for different sectors i.e. irrigation, domestic, industrial, energy etc. However, Central Water Commission (CWC) has estimated the annual water requirements for the state as well for All India for 2000, 2025 and 2050. As per their estimate of year 2000, the total domestic water needs were 42 BCM out of total water needs of 634 BCM. As per CWC, the water consumption for domestic consumption in the state of Karnataka during 1991 and 2001 has been 1.69 and 2.23.BCM respectively, which is about 5% of all India consumption.

2.2.4 Surface Water Sources

2.2.4.1 Major and Medium Irrigation Projects

The Major and Medium irrigation projects are potential sources for drinking water supplies in their respective command areas. Under integrated water resource management policy of GoK the drinking water receives the first priority amongst various competitive uses like irrigation, industrial etc. The drainage areas of different basins have numerous irrigation tanks and reservoirs. There are 13 major reservoirs in the state, 6 of which are in Krishna basin, 4 in Cauvery basin and 3 in west flowing basins. The reservoirs of Krishna and Cauvery basins are mostly used for irrigation, whereas reservoirs in West flowing river basins are used for power generation.

Major Irrigation Projects of Karnataka include the following: Krishna Raja Sagar Reservoir (Mandya), Tunga Bhadra Reservoir (Bellary), Hemavathy Reservoir (Hassan), Harangi Reservoir (Kodagu), Bhadra Reservoir (Chikkamagalur), Kabini Reservoir (Mysore), Vani Vilas Sagar Reservoir (Chitradurga), Ghata Prabha Reservoir (Belgaum), Mala Prabha Reservoir (Belgaum), Upper Krishna Reservoir (Bijapur), Narayanpura Reservoir (Bijapur), Karanja Reservoir (Bidar), Manjra Reservoir (Bidar), Varahi Reservoir (Dakshina Kannada), Bennithora Reservoir (Gulbarga), Hipparagi Barrage (Bijapur), Nugu Reservoir (Mysore).

Medium Irrigation Projects of the state includes the following: Rajoli Banda diversion weir (Raichur), Hattikone Dam (Raichur), Kanakanala Dam (Raichur), Tunga Anicut, Anajanapur Project, Chandrampalli (Gulbarga), Hagari Bommana halli, Dharma Reservoir, Ambli Gola Project, Ramanahalli Tank, Jambadahalla Project, Narihalla Dam Project, Kolachi weir Project, Areshankar Project, Kalaskop, Nagatana, Chitwadgi, Gundal, Chickhole, Suvarnavathi, Mangola, Hebbana Holla, H.D. Kote, Bachanaki Nala Project etc. (Source: (Strategy paper, 2000-2005)

2.2.4.2 Minor irrigation tanks

There is a recorded history of providing priority to tank development in each village. They were primarily meant for irrigation and as a source of drinking water. Their development was mostly done on a aquifer basis and was in a networked and cascading manner i.e. overflow of upper (higher elevation) tank used to reach the next tank and so on until the last tank (lower most elevation) was filled. Their capacity was decided more on the basis of local needs.

The records indicate the presence of 38,608 minor irrigation tanks. However, most of these tanks are presently not used for irrigation, mainly due to inadequate maintenance and

siltation. As per available data, about 3347 minor irrigation tanks are in active use (out of which 2109 are distributed in 15 districts if south zone and 1238 tanks are distributed in 12 districts of North zone) with a command area of about 4 lakh hectares.

2.2.5 Ground water sources

The groundwater survey is conducted by Department of Mines and Geology and Central ground water Board. A groundwater estimation committee was established in 1982 to look into various aspects of groundwater recharge, use etc. The committee defined scientific ways of groundwater estimation and monitoring. Under a combined World Bank and Dutch assistance, CGWB in association with DMG has established a system of both quantity and quality monitoring. The Groundwater estimation is done on a **five yearly basis** by Department of Mines and Geology, Gok and CGWB. These estimates were last prepared and published in 1999. The most recent data (under publication) are presented in Table 2.5.

SI. No.	DISTRICT	Total No	Full tank	Command	No. of Tanks Filled – percentage of ful			e of full	
		of Tanks	level (MCft)	area (ha.)	tank level capacity				
					Not Filled	30%	31-	51-	100%
							50%	99%	
1	2	3	4	5	6	7	8	9	10
(a)	SOUTH ZONE								
1	Bangalore (U)	72	1990.76	6881.00	47	17	3	0	5
2	Bangalore (R)	207	8366.90	26625.00	118	39	24	20	6
3	Kolar	336	10901.33	31817.00	216	102	13	4	1
4	Tumkur	368	17349.26	37491.00	269	27	33	29	10
5	Chitradurga	166	8880.55	21935.00	93	55	11	7	0
6	Davangere	92	4619.47	11265.00	50	26	10	7	0
7	Shimoga	326	3998.67	22659.00	0	41	57	174	53
8	Mysore	92	3313.32	10744.00	29	9	10	19	25
9	Chamrajnagar	64	2310.00	13243.00	51	7	5	1	0
10	Mandya	50	1211.78	4604.00	22	7	6	5	10
11	Hassan	174	5419.39	12527.00	69	45	27	33	0
12	Chikkmagalur	123	3873.69	16776.00	22	24	24	33	20
13	Dakshina Kannada	2	6.93	131.00	0	1	0	0	1
14	Udupi	4	38.96	283.00	0	0	0	4	0
15	Kodagu	33	525.30	2129.00	2	0	12	19	0
	Total	2109	72806.31	219110.00	988	400	235	355	131
(b)	NORTH ZONE		000440	00170.00	400		a (2.2	•
1	Belagum	223	2801.18	23158.96	100	55	31	32	2
2	Bijapur	109	1634.83	20558.00	69	95	8	5	2
3	Bagalkot	42	91.35	10744.00	20	15	3	5	0
4	Dharwad	109	1034.00	13695.00	46	23	9	30	25
5	Gadag	22	975.00	3823.00	12	2	1	8	0
6	Haveri	261	5568.00	24288.00	140	41	53	34	17
7	Uttara Kannada	90	1048.52	13396.00	12	26	24	24	2
8	Gulburga	127	3710.30	22397.66	65	35	15	5	7
9	Bidar	87	2690.25	19131.00	33	19	18	11	6
10	Bellary	66	3583.53	12451.00	6	40	14	4	2
11	Koppal	48	1424.60	9857.00	25	12	2	9	0
12	Raichur	54	1713.78	7716.00	32	10	3	6	3
	Total	1238	26275.34	181245.62	560	303	181	175	66
	State Total(a & b)	3347	99081.65	400355.62	1548	703	416	530	197

 Table 2.5
 District/Zone wise Status of Minor Irrigation Tanks (filled up as on 25 Sept 2004)

Source: Minor Irrigation Department

(Report on SW monsoon rainfall-2004 by DMC).

			As on 31.03.04
SI. No.	Description	Resource	Remarks
1	Net annual ground water availability (ha-m)	1529659.5	
2	Existing ground water draft for irrigation (ha-m)	974731.0	In over-exploited watershed, draft is more than available resource thus tapping static resource.
3	Existing ground water draft for domestic and industrial water supply (ha-m)	96581.0	
4	Existing ground water draft for all uses (ha-m)	1071312.0	
5	Allocation for domestic and industrial use for next 25 years (ha-m)	140693.0	
6	Net ground water availability for future irrigation development (ha-m)	647580.0	Net availability is the actual resource available. In over exploited watershed available resource is taken as zero and not negative. Hence arithmetic tallying (Resource-Draft) is not possible as resource available in one water shed will not be effected by overdraft of adjacent exploited watershed.
7	Existing stage of ground water development (%)	70	

 Table 2.6
 Ground Water Resources of Karnataka State at a Glance

SI. No.	Categorization	Area (Sq. km.)	No. of Watersheds		No. of Taluks	% of state area
1	Safe (S)	111934.62	127	51	Partly Safe/ Semi- critical/ Critical/Over- Exploited 102	58.1
2	Semi-Critical (SC)	16763.52	17	0		8.7
3	Critical (C)	7347.23	10	0		3.8
4	Over Exploited (OE)	56618.96	80	22		29.4
	TOTAL	192664.33	234		175	100

Source: Department of Mines and Geology

The GW potential has been estimated by considering annual rainfall, infiltration, seepage from canals, return recharge from surface and groundwater irrigation, recharge from flood prone areas, seepage from tanks and other water bodies etc.

From Table 2.6, it can be observed that the estimated net ground water recharge in Karnataka is 1529659.5 ha-m. The ground water draft for irrigation is 974731.0 ha-m and for domestic and industrial use, it is 96,581 ha-m. For domestic and industrial usage provided for next 25 years it is 140693.0 ha m. therefore, the ground water available for future development is 647580.0 ha-m.

However, GW is not extracted uniformly throughout the state. Out of 234 identified watersheds in Karnataka, there are 80 over exploited basins, where in the total annual draft (for irrigation, domestic and industrial usage) is higher than the net annual ground water recharge. Ten basins are critical, where stage of development is more than 90% but less than 100% and 17 basins are semi- critical, where ground water development is between 70 to 90% and ground water declines in ether pre or post monsoon periods. Balance 127 basins

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are safe, where stage of ground water development is less than 70% and there is no significant decline in pre and post monsoon ground water levels.

2.2.6 Springs or Jaris

These are another source of water supply, mainly available as ground water springs. These are harnessed for drinking water purpose and to a limited extent for irrigation in Chikkamagalur, Dakshina Kannada and Uttara Kannada districts of Karnataka.

2.3 Water Quality

Technology developments in drilling and pumping methods have resulted in massive exploration of ground water mainly for irrigation and industry. Irrigation accounts for about 90.3% of total withdrawals and industry and domestic uses accounts for 9.7% approximately. Exploration of ground water to meet increasing demand of conflicting sectors like irrigation and industry is causing imbalance between withdrawal of ground water and the deficient recharge and has resulted in continuous and rapid lowering of water table. During last 30 years, abnormal lowering of water tables in *Tumkur, Kolar, Gulbarga, Raichur* and many other districts have been observed. This has changed the hydro-geochemical environments of aquifers and has enhanced the toxic and undesirable chemical constituents like Fluorides, TDS, brackishness etc. beyond permissible limits. Consumption of this poor quality water by human beings is leading to occurrence of various diseases.

Similarly indiscriminate use of fertilizer and insecticides, unscientific usage of single pit latrines, open disposal of domestic wastewater etc. have further deteriorated the quality of ground water with excess Nitrates and Brackishness. Subsidies to agriculture sector and to electricity tariffs for irrigation besides favorable terms and conditions for developing irrigation sources have also led to indiscriminate and disproportionate level of ground water sources, water quality is becoming much more critical than ever before.

Overall these are more than 21,008 habitations in the state having water quality problems. Out of these, 5,838 habitations have excess fluoride, 6,633 with excess iron, 4,077 with excess nitrates and 4,460 habitations with hard water (TDS).

Overall, the state has sufficient resources to meet the water demands of its growing population. However, the distribution of rainfall and its management in few *taluks*/watersheds need considerable improvements. On water management side, it requires both better generation (collection and storage including rainwater harvesting, recharge measures) as well as conservation (efficient irrigation management systems, reduction in unaccounted flow and encouragement to water re-use practices) etc.). The major consumption of water is for irrigation and therefore it needs to be focused first. The commercial agriculture with high doses of irrigation, fertilizers and chemicals reaching the GW, seepage to surface water bodies) and therefore needs to be improved simultaneously. It requires changes in both the cropping pattern as well as in irrigation management. Overall, integration and regulation would be the key elements for improving drinking water supply management in rural areas.





Chapter III

Rural Drinking Water Supply in Karnataka Policy and Program Development

The rural water supply is a state subject and efforts have been made since independence for development of the sector. The initial emphasis of developing rural drinking water supply systems was to increase water availability in rural areas. However, the target based approach did not yield desirable results. The state mission of providing adequate and safe water to all its rural habitations required a number of policy changes, which has been well demonstrated in the development of various programs. The following sections review various policy and program development efforts in the state besides reviewing more recent efforts on integrated water resource management.

1 Policy Development in Karnataka

Karnataka's water policy has evolved in consonance with the National Water Policy. The state's changing policy emphasis on the RWS sector is reflected in the types of schemes and programs undertaken over various plan periods. The approach of the Government of Karnataka was essentially to "bring the service level of 25 lpcd within a time frame which was enhanced to 40 lpcd. According to the State Water Policy (2002)¹, there is a need to provide drinking water at the rate of 55 lpcd in the rural areas, 70 lpcd in towns, 100 lpcd in the city municipal council areas, and 135 lpcd in city corporations. However, the National Water Policy indicated that "adequate safe drinking water facilities should be provided to the entire population both in urban and in rural areas. Irrigation and multipurpose projects should invariably include a drinking water component, wherever there is no alternative source of drinking water. Drinking water needs of human beings and animals should be the first charge on any available water"².

With the advent of National Drinking Water Mission in 1986, the policy of coverage of problem habitations was reinforced with complementary objectives, which included the following:

- To cover residual problem habitations;
- To evolve an appropriate technology mix;
- To improve performance and cost effectiveness of the ongoing schemes;
- To create awareness among villagers on the use of safe drinking water;
- To take measures for the sustainability of the sources and the systems.

In late 1989, Government of India introduced policy level changes including the communityoriented approaches in rural water supply and sanitation sector. The Accelerated Rural Water Supply Program (ARWSP) guidelines stressed the importance of Community Participation Management, Information, Education and Communication (IEC), Human Resource Development and Research and Development component. An IEC strategy has been developed for the whole country and 65 districts were selected for the initial IEC activities. During the period, increased attention was given to rural sanitation also, but many

¹ State Water Policy, Government of Karnataka, Water Resources Department, 2002.

² National Water Policy, Government of India, Ministry of Water Resources, April 2002.

of these guidelines could not be put in practice due to weak institutional structures and poor delivery mechanisms³.

With the Central Government's increasing concern over the fact that only the main villages were being served, while hamlets were totally neglected, service levels in hamlets became the next area of policy emphasis. With the introduction of the concept of hamlets 1991, a survey was initiated again by the RGNDWM to identify problem villages and hamlets surrounding the main villages.

In 1991 the National Drinking Water Mission adopted following norms for providing safe drinking water to rural population in the villages: (a) 40 litres of drinking water per capita per day for human beings; (b) additional 30 lpcd for cattle in desert districts; (c) One hand pump or stand post for every 250 persons; (d) water sources should exist within 1.6 km in the plains and within 100 m elevation difference in the hilly areas; (e) the water is defined as safe if it is free from bacteriological and chemical contamination.

With this as backdrop, the Integrated Mini Mission Approach was adopted, where the district was the unit. Inter-sectoral coordination with all the other concerned departments of the state and central governments was envisaged to tackle all the issues pertaining to provision of safe drinking water. Other important areas of emphasis of the "Mission Approach" were tackling water quality problems, sustainability of sources and systems, eradication of guinea worm infestation, etc, under the Sub-Mission on Water Quality. This kind of approach and policy emphasis continued till 1998.

Karnataka has gone for a major policy shift in 1993, which transferred the operations and maintenance of rural water supply schemes to the *Gram Panchayat*. GoK also transferred maintenance of all hand pumps to the *taluk panchayats* to ensure economies of scale and also to make sure that trained manpower is easily available

In spite of gigantic investments in the water and sanitation sector, many of the water supply and sanitation facilities were either not functional or not used effectively by the community due to several reasons. It was felt that the rural water supply and sanitation sector required to be examined from sustainability considerations. In view of this, the Government of India decided to pilot the reform in RWSS sector through the Sector Reform Program (SRP) in 63 districts of 26 states across the country.

In October 1997 the Empowered Committee (Ministry of Rural Areas and Employment), recommended to earmark 20% of central sector funds to participatory community based projects including IEC.

A radical shift in the approach for implementation of RWS programs was made during 1998. During 1998, Gol issued a new set of guidelines for implementation of RWS programs. These guidelines marked a qualitative shift from a supply driven approach to demand responsive approach.

In 1999 revised guidelines for implementation of rural water supply and sanitation were issued (10% capital cost sharing, community management, capacity building, hygiene education, community monitoring, operation and maintenance etc.). These guidelines marked a paradigm shift from a supply driven approach to demand responsive approach. During the period, several donors were involved in providing

³ Dr. K. Balachandra Kurup, Child Environment, Water Supply, Sanitation and Hygiene: Situation in Karnataka State, Reported prepared as part of the Joint Monitoring Programme for UNICEF & WHO, September 2001.

assistance to the rural water supply and sanitation sector. In the early 1990's Karnataka also gained the experience in implementing community based integrated rural water supply and environmental sanitation project with funding from The World Bank, Government of Netherlands and Danida in the rural sector and Asian Development Bank in the urban sector. Another major policy shift is evident in the externally aided and Gol supported RWSS projects in the State, wherein capital cost sharing by users has been introduced.

The Rajiv Gandhi National Drinking Water Mission, Government of India supported the implementation of sector reforms in three pilot districts (Mysore, Bellary and Dakshina Kannada) in the state from 1st April 1999. According to the guidelines⁴ funds from District Water and Sanitation Mission (DWSM) should be released to the VWSC only after the contribution in respect of the capital cost share component is mobilized from the community and deposited in the account of the VWSC opened for the purpose. Besides, it must be ensured that the capital cost share component and subsequent contribution towards full O & M as well as replacement cost should come from the user community. Similarly, funds from MP's, MLA's, *panchayat*, industries, charity, donations etc. should not be entertained. The same guidelines were made applicable to *Swajaldhara* program also.

The State Water Minister's Conference held in Cochin in December 1999 adopted the reform principles and these are consistent with the Eight and Ninth Five Year Plans and the New Delhi Declaration of 1990.

The *Swajaldhara* program came into existence from 2002. Under *Swajaldhara* I, the projects could be taken by habitations, GPs, groups of GPs etc. These schemes were to be sanctioned by DWSC, ensuring that the suggested schemes conformed to the principles of Swajaldhara. Under Swajaldhara II, district was considered as the unit for project implementation. According to the guidelines, the closing balance of sector reforms project was to become the opening balance of *Swajaldhara* II from 1st April 2004 and incomplete schemes could get completed in the next financial year under Swajaldhara II. The same guideline also emphasized that "no funds should be allocated for schemes of augmenting the supply beyond 40 lpcd in any district until funds are provided for covering all NC and PC habitations with the prescribed level of supply in all the districts of states". "Only after a district has been "fully covered", schemes for higher service level i.e., 55 lpcd can be undertaken but the extent of community contribution would be 20% of the estimated capital cost of the scheme. The design of such schemes was to involve rehabilitation and/extension of existing schemes rather than designing and execution of a new scheme ignoring the assets already created.

Swajaldhara also supported undertaking schemes for providing drinking water on priority basis to those primary schools that did not have drinking water facilities. The community and PTA were required to contribute at least 10% of the capital costs of the schemes.

3.2 Program Development

The rural water supply is a state subject and plan allocations have been made for the development of the sector right from the first Five Year Plan of the state. In Karnataka, the initial emphasis under Rural Water Supply (RWS) has been on increasing the water availability through construction of open wells in habitations having no drinking water wells or where these numbers were inadequate. Provision of safe and adequate water to all the 56,682 rural habitations has been a major priority with the State Government for several years. During 1960s, it was observed that only easily accessible habitations were being repeatedly attended for water supply schemes, leaving the difficult habitations. With

⁴ Guidelines issued by the Rajiv Gandhi National Drinking Water Mission, 1999

recurring droughts, GoK through its Public Health Engineering Department started a bore wells program in 1971 with the help of 5 drilling rigs received from UNICEF.

To accelerate the coverage of problem habitations, Gol initiated Accelerated Rural Water Supply Program (ARWSP) in 1972-73 with 100% grant-in-aid to implement water supply schemes in problem habitations. With the introduction of Minimum Needs Program in 1974-75, the ARWSP was withdrawn (functions merged into MNP). The ARWSP was however reintroduced in 1977-78, when the progress in supplying safe drinking water to identified problematic habitations under MNP was found unsatisfactory.

During the Seventh Plan period, the program of rural water supply was given a new dimension when a mission approach was adopted under Technology Mission on Drinking Water and related Water Management also called National Drinking Water Mission (NDWM), which was introduced in 1986. During the Plan period, the approach of the GoK was essentially to "bring the service level of 25 liters per capita per day (lpcd) within a time frame which would be enhanced to 40 lpcd in future, within a timeframe, depending upon the availability of funds.

NDWM was subsequently renamed in 1991 as Rajeev Gandhi National Drinking Water Mission (RGNDWM). With the Central Government's increasing concern, service levels in hamlets became the focus area of policy emphasis. Therefore, a survey was once again conducted by the RGNDWM in 1991 to identify problem villages and hamlets surrounding the main villages. With these developments, the Integrated Mini Mission Approach was adopted, where the district was the unit. With the adoption of Mission Approach, Submission projects were launched in 9 districts of the state.

In the early 1990's Karnataka also implemented community based Integrated Rural Water Supply and Environmental Sanitation Project with funding from World Bank, Netherlands and Danida in the rural sector. Another major policy shift is evident in the externally aided and Gol supported RWSS projects in the State, wherein capital cost sharing by users has been introduced.

Danida assisted project: Between 1980 and 1989, Danida supported rural drinking water projects in three districts. In the first phase, it addressed issues related to rejuvenation of hand pumps, supply of drilling equipment, provision of spare parts and training. The next generation of Danida assistance limited itself to maintenance systems of hand pumps. The third generation projects, started in 1991, adopted an "integrated approach". This led to a follow-up project (*Jalnidhi I*) in October 1996 with a budget of Rs 600.1 million, where the experiences of the integrated approach were adopted in a larger area. In early 2003, another agreement was signed with an outlay of 55.6 crores called Jalnidhi II.

World Bank assisted project: The Integrated Rural Water supply and Environmental Sanitation Project (IRWS&ESP) started in 1993-94 in two phases which was planned to cover approximately 1,200 villages in 16 districts. The project was managed by PPMU. The total outlay was Rs. 4, 472.00 million. The project cost was shared between the World Bank (78 per cent), Government of Karnataka (15 per cent) and the Community (8 per cent). The objective of the project was to involve the community in the planning, implementation and management of rural WS & ES facilities and in their effective operation and maintenance (O&M). The community also shared the capital costs (30 per cent) of the environmental sanitation facilities and was expected to cover the full O & M costs of both WS & ES facilities. The community played an important role in decision making and managing the local level activities through the Village Water and Sanitation Committees (VWSCs). The project has been completed and majority of the villages the VWSCs have taken the responsibility of managing the system. The current World Bank project started in Feb 2002 with a total outlay of USD 193.4 million.

Netherlands Assisted project: This project covered 191 villages in four districts with a total budget of Rs. 887.1 million. The project focused on community participation in the project, which was done quite successfully. The project was initiated in 1993, but could be completed only in 2000.

UNICEF Support: UNICEF was probably the first premier organization, which supported the RWS sector in Karnataka with the supply of drilling rigs, hand pumps, establishing the hand pump maintenance teams, spare parts and training in 1971. However, during 80's the focus of UNICEF moved to sanitation, water, environment and hygiene promotion. During 1988-89 UNICEF provided financial and technical support for the establishment of State Sanitation Cells and State Institutes of Rural Development (SIRDs) in selected States. Over the past few years, UNICEF-GoK cooperation has grown further.

Sector Reforms: The RGNDWM, Gol, supported the implementation of community based RWSS programs under Sector Reforms in three pilot districts (Mysore, Bellary and Dakshina Kannada) in the state from 1st April 1999. An amount of Rs.400 million was allocated for water supply and Rs. 100 million for sanitation in each district. The PPMU, RDED coordinated the activities at the State level and the Zilla Panchayat at District level. As per the guidelines following institutional set up has been established for implementing and monitoring the activities:

- District water & sanitation mission as Governing Body;
- District level implementation committee with CEO/ZP as its Chairman;
- Taluk level water and sanitation committee with Executive Officer as its Chairman;
- Village water and sanitation committee (VWSC) or Village Development Committee (VDC) in project villages.

However, the implementation was slow. The reasons for slow implementation include lack of understanding on the concept of sector reforms project, difficulty in convincing the elected representatives, institutional weaknesses etc. More than 3900 schemes have been complted under the SRP.

Swajaldhara (2002) – The initiation of Swajaldhara project has taken a new dimension, wherein 577 schemes were approved and 213 projects have been completed.

A compiled list of GoI and externally funded rural water supply programs is presented in Table 3.1.

		5		
SI. No	Program	Districts	Year	Outlay
1	Netherlands Assisted Integrated Rural Water Supply and Sanitation Project : 05 Districts, 201 villages	Dharwad Haveri Gadag, Bijapur Bagalkot	May 1993 - Mar 2000	Rs.88.71 Cr
2	World Bank Assisted Integrated Rural Water Supply and Environmental Sanitation Project 16 Districts Phase I 247 villages Phase II 857 villages Total 1,104 villages	Bangalore, Tumkur Shimoga Mysore Chamaraja Nagar Mandya Hassan DK Udupi Belgaum Bidar Gulbarga Raichur Koppal Bellary Davanagere	Jun 1993	Rs.447.20 Cr
3	Sub Mission Projects 14 Districts – 632 villages 45 Schemes	Bellary Belgaum Bijapur Davanagere Dharwad Gadag Haveri Koppal UK Gulbarga Kolar Tumkur Raichur Chitradurga	1994-95 To 2000-2001	Rs.150.31 Cr
4	GOI Funded Water Technology Mission – Mini Mission Project 3 Districts – 914 villages	Gulbarga Dharwad Raichur		Rs.18.58 Cr
5 6	Nirmala Grama Yojana DANIDA Assisted Rural Drinking Water Supply and Sanitation Project	Mysore Kolar Chitradurga Bijapur Bagalkot, 105 villages	Oct 1995 Oct 1996,	Rs.55.5 Cr
7	HUDCO Financed Swacha Grama Yojana 1000 villages	Four districts, 300 villages, Karnataka	Dec 2002 2001- 2002	Rs 35.2 crores Rs.200.00 Cr
8.	JAL NIRMAL – II KARNATAKA WATER SUPPLY AND SANITATION PROJECT PILOT BATCH I BATCH	W.S R&D Belgaum 14/21 14/22 Dharwad 03/05 03/05 Gulbarga 02/09 02/09 Bagalkot 31/65 Belgaum 49/97 Bijapur 30/100 Dharwad 23/55 Gadag 30/88 Gulbarga 33/129 Haveri 44/113 Uttar Kannada 48/256 Bidar 50/208 50/208 Koppal 18/53 18/53 Raichur 17/86 17/87 Under way	Feb 2003 Jun 2003	Rs.13.76/14.74 Cr
a	Saral Jal Scheme	Belgaum	April 05 May	Rs 00 72 Cr
J.	Bailhongal 41 schemes Raibag 34 schemes Total 75 schemes	Deigauin	2003	NS.UU.72 GI
10.	Integrated Tanda Development Programme	Gulbarga 73 Haveri 55 Dharwad 06 Gadag 01	Jul/Aug 2003	Rs.15.85 Cr +

Table 3.1 Rural Water Supply and Sanitation Programs in Karnataka

	4 Districts – 135 Tandas			Rs.01.21 Cr CC
11.	Jhari Scheme	Siddapur Sirsi Yellapur		Rs.01.99 Cr
	(UK Financed)	Ankola Joida Karwar		
		76 schemes		
12.	Multi Village Schemes			
	3 Districts (The World Bank)	Belgaum Haveri, Bijapur	Mar 2003	

3.3 Analysis of Externally Supported Programs/Projects

3.3.1 The World Bank supported projects

The **KIRWS & ES project** (1993-2000) was one of the biggest social experiments in the rural water supply and environmental sanitation sector in India⁵. The total outlay was Rs. 4,472.00 million. The project cost was shared between the World Bank (78 per cent), Government of Karnataka (15 per cent) and the Community (8 per cent). The community also shared the capital costs (30 per cent) of the environmental sanitation facilities and full O & M costs of both WS & ES facilities. The community's role was central in the project and beneficiaries were to play an important role in decision making and managing the local level activities through the Village Water and Sanitation Committees (VWSCs) at the village level. This project demonstrated an approach to the donors and other stakeholders as to how private sector could be involved in the sector. KIRWS & ESP was one of the first attempts to introduce demand driven and user managed O & M approach with the active involvement of *Gram Panchayat* and VWSCs.

Although the World Bank supported project was conceived as an integrated project the role of the community in the planning and management of the proposed water supply in villages was rather limited. The experience, views and perceptions of village communities has not been taken into consideration seriously, while designing the water supply component and in finalization of designs and technology choices. As a result most deserving areas were not covered in the design and in some places over designing was done.

Selection of villages: Several of the project villages had existing schemes and they had been using the facilities without paying any water tariff. In view of this it was extremely difficult to ensure the community participation and O & M recovery from these villages.

Equity in distribution of water supply: Since most of the schemes are augmentation/rehabilitation, due attention was not given on the assessment and upgradation of existing systems. As a result the delivery of services was unsatisfactory and this had mainly affected the poor and the marginalized groups. There were problems in institutionalizing tariff in the existing connections, affecting the cost recovery in several villages;

⁵ Dr. K. Balachandra Kurup, Community Management in Water and Sanitation Programme: An Institutional Approach, Prof. V. Raman Endowment Lecture at the 33rd Annual Convention of Indian Water Works Association, January 5-7, 2001, (Published in the Journal of Indian Water Works Association), Mumbai, India.

3.3.2 Netherlands Assisted Project

The Integrated Rural Water Supply and Sanitation Project (1993-1998) with support from Netherlands Government, was implemented in the State with a strong community participation component. But adequate thrust was not given to capital cost sharing as well as full O & M by the VWSC and the users. This project covered 191 villages in four districts with a budget of Rs.887.1 million⁶. Even though the water supply project started in 1993 it could be completed only in 2000. Historically, rural water supply works have been implemented departmentally. However, Netherlands supported project, adapted an alternative approach for water supply by introducing private sector participation.

- project villages were grouped into packages for contracting purposes, on the basis of need for water, technical quality of works, package value of work and aerial distribution of villages;
- for each package, consultants were employed for source investigations, identification of water supply schemes and preparation of reports, design and preparation of tender documents and for the supervision of construction and commissioning activities;
- similarly, for each package, contractors were engaged for construction, trial runs and initial maintenance, which included all water supply works and goods required for completion.

Although, the Netherlands project was conceived as an integrated project, yet in reality, the role of the community in the planning and management of the proposed water supply in villages was very limited⁷. Because of procedural constraints, little consideration was given for water supply systems (both piped and traditional) existing in villages as well as the interest and concerns of the local communities, especially in areas where water scarcity was a serious problem. The experience, views and perceptions of village communities was not adequately sought or considered except during the review of water supply proposals for 21 villages having scarcity and water quality problems (Package One⁸). The prolonged delay experienced in setting up initial water supply implementation for the Netherlands assisted project seriously affected the quality of community participation for all project components in concerned villages following initial participatory activity.

However, the multi-village scheme in Morab, the GP continues to collect the water tariff from the community for the use of water from households and public stand posts. This demonstrates that O & M and payment towards the cost of water can be mobilized through community education and motivation. For the sustainability of systems, it is considered important that village communities and committees be involved in the identification (and design) of solutions and play a key role in the operation and maintenance of facilities constructed.

3.3.3 Danida Assisted Project

The Jalanidhi project was conceptualized with an objective to demonstrate community managed, sustainable drinking water supply and sanitation systems within the Gol/GoK

⁶ Plan of Operations: Integrated Rural Water Supply and Sanitation Project Karnataka, BKH Consulting Engineers, June 1993

⁷ Dr. K. Balachandra Kurup, Community Participation and Management in Integrated Water Supply and Environmental Sanitation Programme: Methodology for Implementation, October 1998, prepared for Royal Netherlands Embassy and BKH Consulting Engineers, Delft, Netherlands.

⁸ Package One Review Report, Karnataka Integrated Rural Water Supply and Sanitation Project, April 1999.

policy frameworks, infrastructure and local needs⁹. In the first phase of *Jalanidhi* (1996-2002), the institutional base was strengthened with a view to improve the drinking water situation in each of the village habitations. The Phase 1 was implemented in four districts of the state and it was designed to empower GPs to take the O & M role and to achieve self sufficiency in O & M¹⁰. In the Jalanidhi project *taluks*, which were either safe or semi-critical (not categorized as black/over exploited) were selected. In those blocks, villages with water availability of less than 40 lpcd but more than 20 lpcd were short listed. After the awareness creation and social marketing, the GPs were asked to submit their willingness to pay the capital contribution and O & M costs to the District Coordination Unit (DCU).

In Jalanidhi Phase II community and GP was to contribute 10% and 5% of the capital cost respectively. The strategy was to demonstrate appropriate approaches such as decentralized and participatory planning, implementation and management; demand responsive supply of water facilities based on cost sharing and O & M by the community and VWSC. Danida spent substantial time in reviewing, analyzing and consolidating the experiences and best practices for minimizing the time for completing the activities. A detailed project cycle was evolved based on the lessons learnt and it was realized that scheme cycle is more appropriate than the GP cycle. As a result focus was shifted from GP to VWSC level. This also helped in curtailing the number of days of completing the project/scheme cycle i.e. from 717 days to 536 days.

Danida assisted programs had a strong gender integration in the RWSS program and about one year hand holding. This hand holding has assisted in development of local VWSCs to get equipped as well as confident in managing the RWS programs at local level. However, while adopting such strategies, the resource implications could be a limiting factor.

3.3.4 Jal Nirmal project (2002-2007)

For this WB assisted project, GoK has selected 11 districts in northern Karnataka, with an estimated population of 15.5 million. They have been selected based on scarcity of drinking water, water quality problems and larger proportion of poor and socially disadvantaged people. All the GPs in the project districts are eligible to apply provided they agree to follow the project guidelines. Under the project, approximately 700 GPs (around 2100 villages) are considered in 4 batches, consisting of 100-200 GPs in each batch of the project. The GPs are being selected based on following criteria and weightage¹¹.

Higher proportion of poor and vulnerable groups: 50 marks Water quality and quantity problems: 40 marks (20 marks for each) Higher level of tax collection efficiency: 10 marks

The GPs/villages with more than 55 lpcd are not entitled to be considered to receive the project support.

For implementation of the scheme, a 24 month scheme cycle is being developed and followed, consisting of four phases in the project villages: (a) Pre-planning phase -3 months; (b) Planning phase -6 months; (c) Implementation phase -12 months; (d) Post implementation phase -3 months). The project is under implementation and the initial

⁹ Frank Hanrath & Dilip Fouzdar, The Story of Danida's approach to creating community level drinking water supply systems in Karnataka, Paper presented at the 6th Water Asia Conference, New Delhi, September 2005

¹⁰ Report on O & M Strategy, Guidelines and Procedures, TARU Leading Edge Pvt Ltd, March 2003.

¹¹ Project Appraisal Document on the Second Karnataka Rural Water Supply and Sanitation Project, The World Bank, November 16, 2001
results in community participation, capital cost sharing and project management are promising.

3.4 **Program Development in Sanitation Sector**

The issues of sanitation promotion were taken up at the Gol and later at the GoK level as early as the IV Five Year Plan. In the V Five Year Plan the government introduced the 20 point Minimum Needs Program, wherein point no 8 dealt with the provision of drinking water and sanitation to all problem villages. The onset of the International Drinking Water Supply and Sanitation Decade (IDWSSD) 1981-1990 saw the evolution of the new policies and approaches in the sector. The targets of the decade were to provide safe water to all and sanitation to 25% of the rural population. The Gol also launched a low cost sanitation program with the help of the UNDP/World Bank. The other multilateral donors were the UNICEF and ADB. Among the bilateral donors who supported GoK were the Governments of Netherlands, Denmark etc.

The sanitation program also got an impetus in the VII Five Year Plan period (1985-90). The new program aimed at construction of sanitary latrines in all village level institutions like health centers, schools *anganwadis* etc. Subsequently construction of the individual household latrines under the Rural Landless Employment Guarantee Scheme and Rural Housing projects including the Indira Awaas Yojana (IAY) were started from January 1, 1986. The Central Rural sanitation Program (CRSP) was introduced in 1986. Guidelines were issued and the same was later modified in 1991. Under the CRSP, provision of sanitary latrines to SC/ST and below poverty line families was envisaged. The required resources had to be shared by Central and State governments on a 50:50 basis. The program was a supply driven program and community participation was not a primary factor. The coverage, percentage of success and use of the toilets constructed was poor. The target was to cover 25% of the population at the end of the seventh Five Year Plan.

Rural sanitation was also launched as part of the 20 point program in 1986 and the Minimum Needs Program from the year 1987-88. In the same year the Council for Advancement of Peoples Action Rural Technology (CAPART) was established for accelerating the implementation of rural sanitation program through the grass root level NGOs. In 1988-89 UNICEF provided financial and technical assistance for the establishment of the State Sanitation Cells and the State Institutes of Rural Development in selected states. In late 1989, the working group on rural sanitation listed 15 weaknesses of the ongoing sanitation program. The New Delhi declaration of 1990 came out with a strategy for the decade. The RGNDWM was established in 1991. However during 1991, the achievement for construction of rural sanitary units in the country was only 2.5 %.(0.4 million latrines at an investment of Rs. 58.20 crores). In 1992, in the National Workshop on Sanitation organized by the RGNDWM and UNICEF, the experiences of various types of sanitation and hygiene education strategies were deliberated upon. In 1993, after the first National Seminar on Rural Sanitation, the momentum picked up. The guidelines were again revised in 1993. Though there was acceleration in implementation, at the end of the Eighth Plan the national coverage was about 20%.

In 1993, the Second generation of the World Bank supported Integrated Water Supply and Environmental Sanitation Project (IWS&ESP) was launched in Karnataka and Maharashtra.

The specific programs carried out in sanitation in the state include CRSP, *Nirmal Grama Yojana, Swachgrama Yojana* and Total Sanitation Campaign. Further, most of the externally aided projects also had a sanitation component. Total Sanitation Campaign is a centrally sponsored scheme being funded outside state budget.

3.4.1 Nirmal Gram Yojana

The state commenced an exclusive rural sanitation project under Nirmal Gram Yojana in 1995. The programme concentrated on promoting construction of HHL in rural areas through providing subsidy of Rs 2000 for BPL families and Rs 1200 for APL families. Till 2004-05 more than 10.30 lakh HHLs have been constructed in the state. Since FY 2005-06, the allocation for the project has become an integral part of the state's contribution to Total Sanitation Campaign.

3.4.2 Panchsutra

This is a comprehensive rural habitation improvement project in 1300 villages under a scheme called Panchsutra. The programme is being funded through a HUDCO loan of 80%, 10% contribution from community and 10% by the state government. Under the project, community contribution can be partly in cash and partly in kind. The project is a comprehensive sanitation programme of a village with five components viz. covering paved roads, sullage and storm water drains, individual household latrines, community compost yards and smokeless chullahs for every household. Each village gets an allocation of around Rs 20 lac.

3.4.3 Total Sanitation Campaign

In the rural sanitation sector the national program known as the "Central Rural Sanitation Program (CRSP)" was introduced on 2nd October, 1986 with resources being shared by the Centre and the States. Rural Sanitation was also launched as part of the 20-point program of the Government in 1986 and the Minimum Needs Program (MNP) from the year 1987-88. In 1986, the Council for Advancement of People's Action and Rural Technology (CAPART) was formed for accelerating the implementation of rural sanitation program through the grass root level NGOs.

Total Sanitation Campaign in its new form has been launched on 2 October, 2005. The programme covers Individual Household latrines, school sanitation, Aanganwadi, Women Sanitation Complex and environment sanitation including Drainage, Garbage and soak pits. However, the subsidy amount available under TSC is only Rs 500 per household as compared to Rs 2000 under Central Rural Sanitation Programme. The basis of shift in focus from subsidy to IEC, Human Response Development and Capacity Building activities, is based on the results of a comprehensive baseline survey undertaken by Gol in 1996-97. The survey indicated that privacy and convenience were the main motivating factors for having an individual latrine and only 2% households adopted latrines due to provision of subsidy

5 Lessons Learned from Gol Supported/GoK Projects

The lessons learned from the demand driven approach under World Bank phase I project, initiated the process for involvement of community, in the SRP districts, in the RWS scheme development and management. Although only about 400 schemes were implemented in the three districts under WB I, but it evoked the community to accept the SRP guidelines. It made the acceptance of program easier and also encouraged community participation in planning and implementation. Capacity building of VWSCs assisted in local level institutionalization of the program.

The role of capacity building initiatives under SRP has been positive, wherein NGOs were used to provide one time training especially on O&M aspects. With this, the local level management of RWS schemes has become much easier. However, more needs to be done on capacity building besides O&M aspects.

Thee experience of capital cost sharing in various programs have been encouraging. In earlier projects there was no capital cost sharing. However, under World Bank assisted IRWS&ES, there was 30% capital cost contribution towards environmental sanitation facilities by users. Under Danida assisted project 5% capital cost sharing was followed. The on-going WB assisted Jal Nirmal project adopted capital cost sharing between community, GP and Users separately for water supply and sanitation components. Overall, these policies have made the community to accept the cost sharing and participate in the development process.

3.6 Policy issues on Integrated Water Resource Management

Since time memorial, the hydrological cycle is in existence in nature. Under normal situations, it tries to link, integrate and maintain a natural balance. Due to increase human interventions i.e. changing land use pattern, industrial and other human initiated activities, there are impacts on climate etc., which is causing imbalances in the natural systems. Specific to Karnataka, although there is sufficient rainfall, which although is unevenly distributed, yields enough water to sustain the needs of the people, provided the same is managed in a judicious manner.

Considering the overexploitation in agricultural and industrial activities, and non-judicious management of water resources in the state, State Water Policy 2002 has been formulated with focus on integrated water resource management. Since then following measures have been progressively undertaken towards Integrated Water Resource Management in the state (Source :WRDO):

- 1. A State water policy was adopted during January 2002 stipulating to provide drinking water at the rate of 55 litres per person per day in rural areas, 100 liters per person per day in the City Municipal Council areas and 135 litres person per day in City Corporation areas.
- 2. While making planned supplies of water, preference should be given to the commercial and industrial activities having low water consumption.
- 3. Rules and guidelines for compulsory Rain Water Harvesting over the buildings in the urban areas have been issued under Jalvidhi-2003.
- 4. The Eco Committee established vide GO. No. ID 15 LMS 2000 dated 25/03/2000, considered the rapid loss of vegetative cover in ecologically highly sensitive areas as well as in forest areas, warming high negative environmental impacts. In view of these, it recommended that an integrated action plan to develop the catchment areas from ridge to reservoir point to be drawn up and implemented. The plan should assist in providing vegetative cover, abate the rate of sedimentation and revive perennial streams, nallas, rivulets and other ancillary units. Further, in especially deficit catchments, drainable masonry check dams need to be constructed across gullies and ravines in the catchments to conserve water, both on surface and underground.
- 5. To implement the technique of artificial recharge to ground water source by way of injection wells induced recharge from surface water bodies, conservation of sub surface flows through construction of sub surface dykes and percolation tanks etc.

- 6. Early completion of the on going irrigation and water supply projects so as to exploit the potential on time.
- 7. A review committee has suggested to implement strategies for better management of water resources in irrigation sector, which are as follows:
 - Cropping pattern based on ground realities
 - Proper maintenance of irrigation systems
 - Deficit irrigation
 - Sprinkler/Drip irrigation
 - Conjunctive use of surface and ground water
 - Reduction in conveyance losses
 - Reduction in evaporation from the soil surface
 - Renovation of Tanks
 - Percolation Tanks
 - Reuse of Irrigation Water
 - Use of water of sub optimal quality
 - Planning for average yields and carry over storage
 - Prevention of evaporation loses of reservoirs
 - Desalination
 - Water consciousness

and also by adoption of long term management practices like:

- Creation of surface storage by construction of series of barrage
- Integrating small reservoirs with major reservoirs
- Integrated basin planning
- Inter basin transfer of water

Overall, considerable actions and strategies have been employed through various programs and the delivery strategies have varied, bringing in a new experience.

Chapter IV

STATUS OF RWSS PROGRAM IN KARNATAKA

The chapter presents the status of rural water supply programs in the state of Karnataka. It mainly discusses the status of coverage, water quality, besides project implementation mechanism, institutional and legal framework, finances etc. to provide safe drinking water to rural populace on a sustainable basis. Besides these, it discusses the efforts of the state in developing community managed sustainable drinking water supply systems at local level.

4.1 Status of Area and Population Coverage including Levels of Services

The rural population of the state as per 2001 census is 348.14 lakhs living in 56,682 habitations (27066 revenue villages and 29616 hamlets and tandas). During last few years, GoK has directed its efforts to cover all habitations and provide at least one type of rural drinking water scheme to these habitations.

4.1.1 Status of Service Level

The initial requirement of GoK was to have all habitations with 40 lpcd drinking water availability. As per the norms stated at the national level, habitations with the provision of drinking water at the rate of 40 LPCD within a distance of 1.6 km (or within an elevation of 100 m in hilly areas) are termed as fully covered. Habitations with a provision of less than 40 LPCD are termed as partially covered (PC) and those, with no source of water within 1.6 km (or within 100 m elevation in hilly areas) are termed as not covered (NC) habitations. The habitations, where the source of water has quality problems (not within permissible limits), they are termed as no safe source (NSS) habitations. With changes in guidelines from RGNDWM, the requirement for full coverage has been increased to 55 LPCD. The status of service level in various habitations is as follows:

SI No.	Service Level of Drinking Water	Number of Habitations*
1.	0 LPCD	0
2.	0 - 10 LPCD	1,049
3.	11 - 40 LPCD	10,605
4.	+ 40 - 55 LPCD	27,917
5.	Above 55 LPCD	17,111
	Total	56,682

Table 4.1.1 Status of Service Level of Drinking Water in Various Habitations

Source: Annual Report 2004-05, RDPR (in print), * Status as on 31 March 2005

The **Annexure 4.1** provides changes in service level over time. It can be seen that many of the fully covered habitations have changed to partially covered habitations mainly due to droughts during last 3 years (2002, 03 and 04) as well as due to increase in population without increase in sources for water supply etc. These droughts have caused downward service levels in about 8500 habitations. This happened in spite of GoK efforts to recharge the water sources by recharge/source sustainability measures, hydro-fracturing and by watershed improvement works. Some of the works of tank improvements were also carried under *Jal Samvardhan Yojana Sangha* (JSYS), primarily with focus on minor irrigation tanks. Overall, on account of these efforts, water supply situation has improved in about 4200 partially covered habitations.

4.1.2 Status of Water Supply Schemes

The rural drinking water schemes are based on either surface water or ground water. As per available data 95-96% schemes for rural drinking water are based on groundwater sources and the rest on surface water.

The surface water sources include rivers, reservoirs and springs (*jari*). For rivers normally, a jack-well is constructed and water is pumped, treated, stored (mostly in GLSR) and then supplied as per needs. Similarly, major and medium size reservoirs have been used as the source for developing multi village water supply schemes to cater to a cluster of villages. The other classification of type of water supply scheme is based on service area; a habitation/village or Multi Village Schemes. Some of the multi-village schemes are functioning in Mandya, DK and Dharwad districts. The major limitation of some of these schemes is the need of water treatment and pumping especially in the schemes based on river/reservoirs. This increases the operation and maintenance cost of the scheme. Another water supply schemes are spring (*jari*) based system, under this, there is generally no water treatment as well as pumping and thus the overall cost of operation and maintenance is low.

Normally, three different types of schemes are implemented for groundwater based drinking water supply schemes i.e.

- Bore-well with hand pumps This is the most common type of water supply scheme and is planned to cater to habitations with a population of less than 500. Normally one hand pump is designed to supply a population of 150 to 250.
- Mini water supply scheme (including *Saral Jal* Scheme) This type of scheme is planned for a village/habitation with a population of 500-1000, wherein water is pumped and stored in cisterns for supply to the village population. One bore-well normally caters to 3-4 cisterns of about 2500 liters capacity. The *Saral Jal* scheme is a more recent addition wherein instead of a hand pump, a small 1-1.5 hp single phase motor is used for pumping water from the bore-well to the cistern. This is especially useful, where yield of the bore-well is low.
- Piper water Supply Schemes This type of scheme is generally planned for a village/habitation with a population of more than 1000.

The type of water supply scheme to be taken up at habitation level is decided by total population of the village/habitation. However, the above stated guidelines on the type of scheme can be relaxed in deserving cases where villages/habitations lie in difficult areas and/or having water quality problems. GoK has made efforts to provide all its habitations with at least one type of these schemes. The RWS program in the state is implemented as per the "Transparency Principles" of the state through *Panchayati Raj* Institutions. Although, in early years (till 1990s), the approach was "target" oriented and therefore habitations with easy access or where water supply scheme could be taken up easily were prioritized. However with the introduction of PRI Act 1993, better and transparent systems of development of water supply schemes, has come into existence.

Besides, in quality affected villages, dual water supply schemes are being contemplated. Further, arrangements are regularly made to transport drinking water especially during summer months, to areas where water from local/existing sources is not sufficient to meet their current local demands. The state has faced water scarcity in various areas depending on te year's rainfall. Therefore, a large variation has been observed both in the number of days on which water was transported and the number of villages served.

4.1.3 Scheme Wise Status

The overall status of various drinking water schemes in the state is presented in Table 4.1.2.

SI. No.	Type of Water Supply Scheme	Number of Schemes*
1.	Bore well with hand pumps	1,91,147
2.	Mini water supply Scheme	22,549
3.	Piped water supply Scheme	17,383
	Total	2,31,079

Table 4.1.2 Status of Water Supply Schemes in the State of Karnataka

Source: Annual Report 2004-05, RDPR (in print), * Status as on 31 March 2005

Table 4.1.3 and 4.1.4 presents the growth of various rural water supply schemes over past 9 years. It can be seen that the maximum growth has been in the Mini Water Supply Schemes, whereas there has been minimum growth in schemes relying on hand pumps. Although PWS was a preferred system, however the population of the habitation (village/hamlet) and affordability from both initial and operational cost has been a determining factor in having a decision on the technological choice of the type of scheme.

Year	Bore wells with Hand pumps	MWS	PWS	Total
1995-96	143344	9920	10059	163323
1996-97	150949	11273	10807	173029
1997-98	158041	12851	11732	182624
1998-99	163384	14268	12812	190464
1999-00	166660	15533	13237	195430
2000-01	171725	17022	14095	202843
2001-02	175645	18418	15035	209098
2002-03	177879	19541	15712	213132
2003-04	187818	20880	16275	225073
2004-05	191,417	22,549	17,383	231,079

Table 4.1.3 Growth of Rural Water Supply Schemes in Karnataka

Source: Annual Reports of RD & PR, GoK

Table 4.1.5 presents the progress under multi village schemes in the three districts of Belgaum, Haveri and Bijapur, which have been initiated under *Jal Nirmal* project.

Year Bore wells with hand pumps		Mini	Mini water supply schemes		Piped water supply schemes			Total				
	Т	Α	%	Т	Α	%	Т	Α	%	Т	Α	%
1991-92	3638	3258	90	669	711	106	703	848	121	5010	4817	96
1992-93	3657	3878	106	670	893	133	705	922	131	5032	5693	113
1993-94	4300	4085	95	765	1189	155	780	950	122	5845	6224	106
1994-95	4252	4654	109	1050	1224	117	741	826	111	6043	6704	111
1995-96	5495	7927	144	1203	1351	112	821	898	109	7519	10176	135
1996-97	7412	7605	103	1246	1353	109	1039	748	72	9697	9706	100
1997-98	6922	6684	97	1586	1684	106	912	1101	121	9420	9469	101
1998-99	7052	5611	30	1190	1351	114	940	904	96	9182	7866	86
1999-00	7373	7373	100	1569	1569	100	986	827	84	9928	9769	98
2000-01	5785	2824	49	1016	1220	120	721	665	92	7522	4709	63
2001-02	5703	3920	69	920	1396	152	782	940	120	7405	6526	84
2002-03	5500	3611	66	860	1313	153	725	721	99	7085	5645	80
2003-04	6364	4111	65	1245	1256	101	725	635	88	8334	6002	72

Table 4.1.4 Year wise Physical Achievements of Different Rural Water Supply Schemes

Note: T - Target; A – Achievement; % - % Achievement;

Source: Annual Reports of RD & PR, GOK;

Table	as on Aug 2005				
SI. No.	Districts	No. of Taluks	No of GPs	Population 2001	No of Villages
1	Belgaum	4	18	137443	45
2	Haveri	5	53	288667	143
3	Bijapur	3	31	198673	98
	Total	12	102	624783	286

Source: KRWSSA

4.1.4 Functionality of Water Supply Schemes

It is very important to note that it is not the installation of a scheme but the functionality of the scheme, which ensures water supply to the rural population. PRED (erstwhile RDED) conducted a survey to assess the functionality of various schemes in the state. The compiled results are presented in Table 4.1.6. It can be observed that about 7.0% PWS, 8.2% MWS and 19.4 % bore-wells were found defunct. This was due to poor operation and maintenance of the system and/or unsustainable source. The detailed district-wise functional status is presented in Annexure 4.2.

SI. No.	Type of Scheme	Total Number of Schemes	Number of defunct schemes	Defunct %
1	Bore-well with hand pump	119,049	23,049	19.4
2	Mini Water Scheme	11,708	959	8.2
3	Piped water Supply Scheme	8,345	581	7.0
	Total	139,102	24,581	17.7

Table 4.1.6 Functionality Status of Different Water Supply Schemes in the State

RDPR Reports,

4.1.5 Proximity to WS Schemes

As per the Census of India 2001, over 19% of rural households had access to drinking water within their premises (household connection or own sources), whereas 56% of households had access to drinking water near (within 500 m) their premises (mostly PSP) and the balance 25% had water availability away (more than 500 m) from their premises. The details are presented in Table 4.1.7.

Table 4.1.7 Access to Safe Drinking Water in Rural areas of Karnataka

SI. No.	Access to Water Supply in Rural Areas	Households, %
1.	Within the premises	19
2.	Near their premises	56
3.	Away from the premises	25

Census of India, 2001

4.2 Water Quality

4.2.1 Introduction

With increasing industrialization, urbanization and deforestation, the quality of water resources available to mankind is deteriorating day by day. The supply of drinking water in terms of both quality and quantity is a major concern now. Out of many chemical and biological contaminants in drinking water, excess Fluoride and arsenic are of the utmost concern due to their serious health impacts. The study conducted by Rajiv Gandhi National Drinking Water Mission during 1990-1992 has reported 15 States (including Karnataka) endemic for the Fluorosis. Therefore, effective surveillance and monitoring of water quality becomes very important in the state of Karnataka.

A majority of water supply schemes in Karnataka are ground water based (more than 95%), tapped through hand pump and powered pumps supporting various types of water supply schemes. Ground water was believed to be much more pure than surface water as it was from deeper depths and not connected to pollution sources and was being replenished every year by fresh rain water through the natural geo-hydrological cycle. However, over the period, the quality of both surface water and ground water is being challenged.

The quality of water is normally affected either by chemical or biological (bacteriological) contamination, which could be caused in a natural way or artificially. The extent of drinking water quality problem depends on geo-environment (natural) and anthropogenic activities (industrial, agricultural, domestic). Mostly, the man-made reasons of water quality could be associated with microbiological contamination due to unhygienic sanitation practices including defecation close to open wells, improper design and use of sanitary latrines etc. In

addition, the water quality is affected by indiscriminate disposal of untreated effluents from industrial, domestic and agriculture (indiscriminate use of chemicals, fertilizers, pesticides etc.). Besides these, the geological formation and the constituents of the sub-strata affect the ground water. These activities impact both the quality of surface water as well as ground water. In addition, over exploitation of the sources and degradation of natural processes of recharging to the ground water regime by the rain and surface water bodies is also contributing to deterioration of the ground water quality. Overall, ground water quality is increasingly deteriorating and maintaining the quality of water is becoming a major concern.

4.2.2 Significance of Water Quality

The quality of drinking water affects health of the consumers because certain bacteria and microbial diseases, toxic chemical compounds etc. can be transmitted to the human body through water. Experience has shown that community health and water quality is directly related to each other and that an improvement in the quality of drinking water supply is followed by an improvement in community's health.

4.2.3 Drinking Water Quality Standards

There are a number of drinking water quality standards available in the world. Internationally, World Health Organization (WHO) has prescribed certain permissible and desired limits of various physical, chemical and bacteriological parameters. However in India, the legally "binding" drinking water standard is as suggested by Bureau of Indian Standards (IS 10,500-1991), major features of the same are presented in Table 5.7.1

4.2.4 Ground Water Quality Status in the State

With the deterioration in groundwater quality, The Department of Mines and Geology initiated limited water quality tests during eighties. However, water quality monitoring became an integral part of rural drinking water supply program, when the Sub-mission of Water Quality, Monitoring and Surveillance was established in 1986 under NDWM of Gol. It indicated that a large number of ground water sources used for drinking water supply were chemically contaminated.

In view of the need, the GoK (KRWSSA, PRED, Department of Mines and Geology) conducted a comprehensive state wide water quality survey in the year 2000-2001 (*Reference: Ground Water Quality Scenario in Karnataka, KRWSSA, 2004*). On the initiative of RDPR, the analysis was done for 14 water quality parameters, of 154,491 groundwater samples from 33,667 villages/habitations. The water quality data has been processed and organized using Geographic Information System by Indian Resources Information Management Technologies Ltd. Analysis of water samples throughout the state indicates deterioration in the quality of ground water. As per the data, a number of habitations experience ground water quality problems due to excessive (above permissible limits) concentrations of fluoride (F), total dissolved solids (TDS), nitrate (NO₃) and iron (Fe). It is indicated that 21,008 (38% of 56,682) habitations have been affected by various quality problems in the state. Table 4.2.2 presents the distribution of quality affected habitations have different parameters. It can be further observed that all the sources in 1590 habitations have

Table 4.2.1	Indian Standard Drinking Water Specifications (IS 10,500-1991)
	(Physical, Chemical and Bacteriological parameters)

SI.	Quality parameter	Desirable	Maximum	Remarks
No.		limits	allowable	
			limit	
1	Color (Hazen Unit)	10	25	Consumer acceptance decreases

2	Appearance	Clear	Clear	Consumer acceptance decreases
3	Turbidity (NTU)	5	10	Consumer acceptance decreases
4	Conductivity			Indicates the amount of ions present in it.
5	рН	6.5-8.5	6.5-8.5	It affects the mucous membrane and water supply system
6	Total Dissolved Solids(TDS), mg/l)	500	2000	Palatability decreases, may cause gastrointestinal irritation
7	Total Hardness (mg/l)	300	600	Encrustation in water supply structure and adverse effects on domestic use.
8	Calcium Hardness (mg/l)	75	200	Encrustation in water supply structure and adverse effects on domestic use.
9	Chlorides (mg/l)	250	1000	Taste, corrosion & palatability are affected.
10	Sulfate (mg/l)	200	400	Causes gastrointestinal irritation.
11	Fluoride (mg/l)	1.0	1.5	May cause dental or skeletal fluorisis
12	Magnesium	30	100	
12	Alkalinity (mg/l)	300	600	Taste becomes unpleasant
13	lron (mg/l)	0.3	1	Taste/appearance are effected, has adverse effect on domestic uses and water structures and promotes bacterial growth
14	Nitrate (mg/l)	45	100	Can cause maethaemoglobinemia i.e. bluebaby disease.
15	Bacteria (MPN/100 ml)	0	10	Results in diarrhoea, dysentery, typhoid etc.
16	E. Colli (MPN/100 ml)	0	0	Results in diarrhoea, dysentery, typhoid etc.

been completely affected by excess fluoride and 178 habitations by excess TDS. Annexure **4.2.1** provides district wise number of quality affected habitations. However, as per recently available data, 21,008 habitations have quality problems – excess Fluoride in 5,838 habitations, excess Iron in 6,633 habitations, excess Nitrate in 4,077 habitations, Brackishness in 4,460 habitations (Source: Departmental Medium Term Fiscal Plan 2003-2004 to 2006-2007 published by Rural Development and Panchayat Raj Department).

As an outcome of the analytical water quality study, water quality maps for the state have been produced (Ground Water Quality Scenario in Karnataka, KRWSSA, 2004). The maps provide a synoptic view of distribution and concentration of the sampled villages and the limiting water quality parameter. **Fig 4.2.1 to 4.2.4** presents the levels of F, TDS, N and Fe in ground water samples in various parts of the state. From the presented figures, it can be observed that:

- Higher concentration of: Fluoride has been observed in the villages located mainly in Koppal, Kolar, Bellary, Gulbarga, Davanagere, Bagalkote, Dharwad, Gadag, Chitradurga, Tumkur, Raichur, Bijapur and Bangalore Rural, Bangalore Urban districts. It is commonly reported in ground water samples almost throughout the state.
- Higher TDS content has been recorded mainly in the districts of Bagalkote, Bijapur, Raichur, Dharwad, Koppal, Bellary, Chitradurga, Gadag, Davanagere, Belgaum, Mysore, Kolar, and Bangalore Urban districts.
- Higher Iron content has been mainly observed in the sampled villages in the districts of Mandya, Tumkur, Dakshina Kannada, Chikkamagalur, Haveri, Dharwad, Belgaum, Udupi, Kodagu, Mysore, Shimoga, Gulbarga, Chitradurga, Bellary, Tumkur, Chamrajnagar, hasan, Uttra Kannada, Bijapur, Bagalkote, Kolar, Bangalore Rural and Bangalore Urban districts.
- Higher Nitrates concentration has been mainly observed from *Davanagere, Bellary, Bagalkote, Chitradurga, Chamrajnagar, Chickmaglur, Haveri, Bidar, Raichur, Kolar, Tumkur, Mysore and Bangalore Rural* districts.
- The study also indicates that the samples from villages, located mostly in the districts of *Davanagere, Mandya, Koppal, Shimoga, Uttara Kannada, Kodagu, Gulbarga, Chikkamagalur, Bidar, Belgaum and Bangalore Urban,* indicated incidence of bacteria in the drinking water sources.

SI No.	Nature of parameter	quality	Number of habitations	affected	Habitations water quality	with 100% problems*
1.	Excess Fluoride		5838		15	90
2.	Excess TDS		4460		17	'8
3.	Excess Iron		6633		-	
4.	Excess Nitrates		4077		-	
	Total		21008		17	68

 Table 4.2.2:
 Number of Habitations affected by Various Water Quality Parameters in the State

* All the water supply sources are affected in the habitation

4.2.5 Water Quality Improvement Initiatives

Several sub missions took initiatives for both preventive and remedial measures to manage water quality problems. In fact, Gol agreed to support all quality based sub-mission projects to the extent of 75% of the cost, with the state sharing 25% of the cost. Authority has been delegated to the Sate to plan, approve and implement Sub-Mission projects with effect from April 01, 1998. The current Sub-Mission programs are focused on management and control of arsenic, fluoride, brackishness and iron besides a Sub-Mission program on water quality sustainability.

4.2.6 Water Quality Regulation and Monitoring

For surface water, Central Pollution Control Board (CPCB) has established a network of 480 Water Quality Monitoring stations across the country, 33 of them falls in Karnataka. These stations are mainly for two major river basins namely Krishna and Cauvery. These stations collect, analyze, compile and disseminate technical and scientific data on pollution and the measures needed for the mitigation. The available reports indicate that river *Cauvery* has high Coliforms in certain locations, whereas river *Krishna* has high biological Oxygen Demand (BOD) levels at many locations.

At present there is no regulatory framework for ground water quality. The water quality is tested only when the scheme is implemented. Although, provisions exist for six monthly quality testing of water under all schemes, but the same was not observed in the field.

For monitoring the water quality, the Sub-Mission on water quality has been assisting the state government in setting up district wise water testing laboratories. Under this, a total of 27 district level water testing laboratories have been approved. Out of these only thirteen laboratories are functioning at Bangalore(U), Belgaum, Bellary, Bijapur, Dharwad, Gulbarga, Kolar, Mandya, Mysore, Raichur, Shimoga, Tumkur. Laboratories in other districts are still being established. Twelve laboratories still need to be supported for staff, equipment and consumables.

4.2.7 Technology Options for WQ Improvement

4.2.7.1 Fluoride

Excess fluoride in water is insidious as it does not manifest by way of taste, smell or color in water, which could alert the user of inherent health risks. Fluoride intake can be through water, food items and tooth paste. Long term consumption of high fluoride water can result in dental, skeletal and non-skeletal fluorosis. While non-skeletal manifestations are reversible, dental and skeletal fluorosis are non-reversible. The ingestion of high fluoride into human system together with low nutritional status can cripple a person for life. Diet, rich in calcium, vitamins C & E and antioxidants is helpful in reducing adverse health impact of high fluoride intake.

The strategy recommended to address the problem is as follows:

- Test all drinking water sources (both public and private) to identify safe sources (Fluoride<1.5 mg/L) and unsafe sources (fluoride>1.5 mg/l).
- Mark the unsafe community water sources with red paint for easy identification by users to avoid such sources.
- Carry out dental survey of school children to check if dental fluorosis is prevalent in children coming from affected habitation. If dental fluorosis is prevalent, it is advisable to carry out door to door check up of residents in these habitations for prevalence of dental, skeletal and non-skeletal fluorosis symptoms.
- Create awareness about the ill effects of high fluoride and preventive measures (safe water and nutritional diet). Promote kitchen garden to improve nutritional status.
- Advise community to use existing safe sources within the village/habitation.
- If all sources have high fluoride, it is imperative that domestic defluoridation units are provided as a short-term measure to ensure that users could get low-fluoride water.
- As a long-term measure, steps may be taken to identify an alternate safe source. This could include (pumping of water from safe ground water source, dilution of fluoride by mixing high and low fluoride water (blending), supply of water from a surface source after necessary treatment.
- While promoting the use of domestic defluoridation units (DDUs) the following aspects is to be assessed:

- Technical suitability of technology
- Ease of operation and maintenance
- Capital and O&M costs
- IEC component should precede introduction of DDUs.
- Training of users and suppliers in operation and maintenance.
- Establishment of effective service delivery system on payment basis and linkage between users and private sector service provider
- Monitoring of the performance of DDUs.
- Safe disposal of sludge.
- Water treatment should be taken as the last option when other options are not feasible. DDUs may be useful as a short-term emergency response or in isolated habitations which can not be supplied with safe water from a distant source due to techno-economic feasibility considerations.

However, if the sources are contaminated with fluoride concentration of 2.5mg/l and above, the following technology options may be considered in the order of priority.

- Alternate local sources or from neighboring villages for scattered habitations affected with fluoride
- Distant surface sources treated by slow sand filtration (SSF) for clusters of villages
- Where the fluoride concentration is 1.5 to 2 mg/l blending with potable water from other local sources or from neighboring villages.
- Providing dual supply on pilot basis potable water from surface schemes supplied separately (e.g. tanker supply) for drinking and cooking and the quality affected water for all other uses.
- Providing on pilot basis household de-fluoridation system based on Nalgonda technique/Activated Alumina Process.

In this context, the KRWS&SA is exploring the feasibility of the following arrangement: A consortium comprising the beneficiary GP, NGO and a service provider shall be formed with the assistance of the CEO/ZPED. With the concurrence and willingness of GP, the CEO/NGO will facilitate identification and selection of a service provider who will install the DDU, provide regularly the necessary supplies for use of the system and also take care of the maintenance/repairs. The beneficiary household will pay for the supplies and services provided by the service provider on mutually agreed terms.

Immediate Recommended Action

- Immediate identification and marking of polluted community sources.
- Dental survey of school children in affected blocks (particularly children coming from affected habitations). This will also provide valuable baseline data.

The feasible technology options for defluoridation are discussed in Annexure 4.2.2.

4.2.7.2 Total Dissolved Solids (TDS)

A close scrutiny of water quality in the project districts reveals that practically in all the taluks with high levels of fluoride, the TDS concentration is also high. There is no simple low cost

technology available for converting into potable water with high TDS. In such cases, the following technology options may be considered in order of priority.

- Alternate local sources or from neighboring villages for scattered habitations affected with fluoride
- Distant surface sources treated by slow sand filtration (SSF) for clusters of villages
- Where the TDS concentration is in excess of the permissible limit, blending with potable water from other local sources or from neighboring villages

4.2.7.3 Nitrate

For nitrate, there are no simple cost effective technologies that could be applied for removal of nitrate from water. In such cases other options such as alternate sources (local/distant) needs should be considered. It is pertinent to mention here that many communities are presently consuming water with high nitrate content (> than 45 mg/l), which is likely to seriously affect the health of the people later.

4.2.7.4 Iron

Presence of iron in drinking water normally does not have any major impact on health. However, consumption of water with concentrations above permissible limits is objectionable due to organo-leptic considerations. The iron contaminated water causes staining of clothes, rusting of sanitary fittings and the container in which water is stored. In areas of iron contaminated water, one could look for local alternate sources. Often, ground water when tapped at shallow depths is likely to contain low concentration of iron and hence should be preferred. Iron bearing water could readily be treated by aeration and sedimentation followed by sand filtration. However, experience with community iron removal plants in the country has not been satisfactory, mainly due to neglect of regular maintenance. At household levels, water can be treated by extended storage followed by decantation and straining through cloth.

4.2.7.5 Bacteriological

The consumption of drinking water with Coliform Bacteria, more than the allowable limits may result in diarrhoea, dysentery, typhoid, etc. Continuous chlorination of water with a minimum residual concentration of 0.2 mg/l, to disinfect the water, is recommended for the purpose.

4.2.8 Status of Water Quality Improvement

In water quality affected villages, GoK has initiated efforts to popularize and install some of the tested technologies for water quality improvement. During 2004-05, following measures have been taken:

- Reverse Osmosis Technology has been attempted and about 100 such plants have been installed in Tumkur, Kolar, Hassan, Davanagere, Belgaum, Bijapur Gulbarga and Gadag at a cost of Rs 10.20 crores.
- 26 Adsorption System Technology plants have been installed in Kolar (6 units), Gadag (16 units) and in Haveri (4 nos.) against a target of 100 units at a cost of 2.30 crores.
- House hold DF (De-Fluoridation) filters have been installed at 11833 houses, against a target of 50,000 units with a budget of Rs 8.87 crores. The Operation

and Maintenance of the above units, which are in the pilot stage needs to be monitored. The Government is providing these individual filters worth Rs. 1800, for which the family wise contribution of BPL and APL families need to be 10% and 20% of the capital cost respectively. The details of progress under these technologies have been presented in **Table 4.2.3**.

In extreme cases and in areas having a bore well of good quality water in near vicinity, water of high fluoride content is mixed with water from bore wells having less fluoride to the extent that the fluoride content of the "mixed water becomes at least less than 1.5 ppm or preferably below 1 ppm.

Further, Dual Water Supply Technology is being contemplated at locations, where safe water is supplied from a remote source by a separate pipe system to the key locations in the village for drinking purpose. Besides, the low quality (high fluoride, iron etc.) water is supplied through the existing pipe network, for non-drinking purposes.

SI.	District	Reverse Osmosis		Adsor	ption	House Hold DF	
No.		Plants		Syst	tem	Filters	
		Allotted	Installed	Allotted	Installed	Allotted	Installed
1	Tumkur	25	25	30		5000	500
2	Kolar	18	18	25	6	10000	3500
3	Hassan	2	2	0		0	0
4	Davenegere	5	5	0		5000	1200
5	Belgaum	16	16	0		0	0
6	Bijapur	21	21	0		0	0
7	Gulbarga	9	9	0		5000	500
8	Gadag	4	4	25	16	5000	3500
9	Chitradurga	0	0	10		5000	1200
10	Gadag	0	0	10	4	10000	600
11	Havari	0	0	0		5000	0
	Total	100	100	100	26	50000	11000

Table 4.2.3 Progress on Installation of De-Fluoridation Plants and Household Filters

Since the above technologies are either non reliable, not satisfactory or are costly, the group of such villages in clusters are now supplied water under multi village schemes. Where the scheme is resorted to by converging water form a perennial river source with water treatment plant for treating water and supplies affected through zonal balancing tanks fed by mains. Transmissions mains, from zonal balancing tanks to village overhead tanks, supply water to the village over head tanks by network of existing/laying additional lines. The multi village water supply scheme at *Morab* supplying treated water to two other villages in *Dharwad d*istricts is an example.

4.3 Project Management in RWSS

The Rural Development and *Panchayat Raj* (RDPR) Department, GoK coordinates the rural water supply and sanitation program in the state. The State has been investing substantial amount of funds from Central Government grants and external assistance under various programs to improve the supply of potable water and sanitation to the rural areas. The state of Karnataka had introduced decentralization in RWS even before the 73rd amendment. Approximately, 96 per cent of the rural water supply schemes depend on ground water and drilling of bore wells for supply of water through Piped Water supply schemes (PWS), Mini Water Supply (MWS) schemes and bore wells with hand pumps. Consequently, coverage and service levels of RWS seem to be generally higher than the national average.

Despite continued and intensified investments in to the RWS sector for more than two and a half decade, the goal of providing 40 lpcd of water to the rural population has not been achieved. More over some of the "fully covered" villages have been found to be falling back to "partial covered" status. This fallback has been attributed to a variety of reasons ranging from poor planning, source sustainability, climatic factors, poor O & M, quality problems, technical reasons etc. The reliability and sustainability of rural water supply is further affected due to poor operation and maintenance practices, poor water resource management and erratic power supply. Therefore, a closer analysis of project management practices (including planning, implementation, operation and maintenance etc.) need to be analyzed and discussed further.

1. **Project Cycle**

Under sector reforms, emphasis on empowering communities in planning, designing, planning, operating and maintaining the water supply, sanitation and drainage facilities at local level was laid. It required a continuous effort in community mobilization, awareness building and developing the required capacities and systems at local level to manage such facilities. However, as a critical feature of such systems, it required that adequate efforts are placed in the right perspective mainly during pre-planning and planning phase of the project, otherwise the later efforts may not bring in the desired improvements and management changes.

- a. RGNDWM has suggested the 36 month project cycle for RWSS projects. It consists of pre-planning phase, planning phase, implementation phase and post-implementation phase. However, GoK has changed the duration of the project cycle under its various programs.
- b. World Bank supported Projects: The KIRWS & ES project (1993-2000) was one of the biggest social experiments in the rural water supply and environmental sanitation sector in India¹². The total outlay was Rs. 4,472.00 million. The project

¹² Dr. K. Balachandra Kurup, Community Management in Water and Sanitation Programme: An Institutional Approach, Prof. V. Raman Endowment Lecture at the 33rd Annual

cost was shared between the World Bank (78 %), GoK (15 %) and the Community (8 %). The community also shared the capital costs (30 %) of the environmental sanitation facilities and full O & M costs of both WS & ES facilities. The community's role was central in the project and beneficiaries played an important role in decision making and managing the local level activities through the Village Water and Sanitation Committees (VWSCs) at the village level. This project experience indicated the donors and other stakeholders on the as to how private sector can be involved in the sector. KIRWS & ESP was one of the first attempts to introduce demand driven and user managed O & M approach with the active involvement of *Gram Panchayat* and VWSCs.

- c. Under Jal Nirmal project (batch I and II) Support Agencies (SA) have been hired to support project implementation. Based on a tripartite contract between the Zilla Panchayat District Support Unit (ZP-DSU) and the Support Agencies (SAs) following functions of SAs have been indicated: The SA shall plan, design and provide necessary technical, community development and supervisory service to the GP and VWSC for implementation of the water supply and sanitation works. The envisaged activities are listed below:
 - Community mobilization, conducting gram sabhas, VWSC formation, VWSC training, capital cost mobilization through VWSC, opening of accounts for VWSC, project and O & M in the banks;
 - Identification of water sources, water quality and quantity mapping, preliminary scheme reports, sanitation plan and the endorsement by VWSC and GP;
 - Preparation of following Community Action Plans (CAPs):

CAP 1: Water Supply schemes Plan CAP 2: Ground Water Recharge Plan CAP 3: Drainage and Lane Improvement Plan CAP 4: Environment Management Plan CAP 5: Sanitary Latrines Construction Plan CAP 5: Sanitary Latrines Construction Plan CAP 6: Women Development Program's Plan CAP 7: Sanitation and Hygiene Promotion Plan CAP 8: GP Strengthening Plan CAP 9: Community Contribution Plan CAP 10: Operation and Maintenance (O&M) Plan CAP 11: Monitoring and Evaluation Plan

All CAPs for villages have to be consolidated at GP level in the form of an Implementation Phase Plan with the time line.

Convention of Indian Water Works Association, January 5-7, 2001, (Published in the Journal of Indian Water Works Association), Mumbai, India.

2. Community Participation in Project Management

4.3.2.1 Introduction

The Water Decade provided important lessons for sector agencies, donors and governments on approaches to community water supply and sanitation improvements. A critical lesson was the significance of relationships between responsible implementing agencies, contractors and the community in planning, implementation, monitoring, operation and maintenance of rural water supply and sanitation facilities. In this regard, community initiatives and actions involving different methodologies can be observed in programs and projects being implemented in different parts of India. However, systematic and effective community participation and management (CPM) is yet to be effectively institutionalized in the water supply sector. Some reasons for this are delay in implementing the water supply component, disintegrated efforts, lack of focus, vested interests of donors and implementers, complex administrative systems and procedures, typically limited functional transparency etc.

2.. Evolution of the CPM

Although Community Participation Management (CPM) activities were originally introduced in bilateral sector projects during the time of the Water Decade and later adopted for multilateral projects, CPM methodology and it's integration with the technical implementation of projects is only partially established and in some situations, yet to be accepted. There has however, been some satisfactory environmental sanitation experience with a range of CPM initiatives introduced, mostly with direct funding to communities. In such cases, project communities or community groups have been able to manage "their programs" effectively. This has involved the concerned communities in all stages of the project cycle i.e. planning, community organization, selection of beneficiaries, unit costing, initial and final designs, selection and quality of materials, mobilization and implementation, contribution to implementation work, supervision, community motivation, hygiene education programs, monitoring, financial management etc.

Overall, Karnataka is one of the first states in India where, decentralization has been introduced in the rural water supply and sanitation sector since 1993. The RWSS sector in the State has been a vibrant one responding to challenges from time to time. A culture has been developed for progressive decentralization and active community involvement. More over, they had the exposure of interacting and associating with the several external agencies like World Bank, UNICEF, Asian Development Bank, Danida, Netherlands etc. The concept of the Village Level Institution based on the Gram Panchayat is intrinsic to the Karnataka Government's approach to community development, organization and local project implementation. To this end, the Karnataka Government introduced the concept of the VWSC, as a functionary of the *Gram Panchayats,* through Government legislation⁶.

3.. Community/Stakeholder Participation

The concept of community participation management has become a standard slogan in the Water Supply and Environmental Sanitation (WS & ES) sector. However, different actors and partners interpret it differently according to their knowledge, experience and convenience. One view is that participation means mobilizing people to approve or accept a project, which has been planned and designed for them. New terminologies like Demand Driven Approach (DDA) and Demand Responsive

⁶ Model bylaws and constitution of VWSCs, Government of Karnataka, 1997

Approach (DRA) etc. has came into existence for some time now, but no clear operational strategy and methodology has been worked out to address these issues in a meaningful manner. Many a times, heuristic decisions are being taken by the donors and implementing agencies on the CPM approaches, without considering the ground realities and analyzing its implications in different social streams.

An essential feature of community participation management is the participation of the community through out the life of the project. However, participation is more meaningful and effective, when there is a shared responsibility between various stakeholders. This was the aim in the Netherlands, Danida, The World Bank and the new stream of GOI supported schemes, wherein an agreement was signed between the VWSCs and the project authorities. The VWSC needs to be established at the start of project in each village and thereafter should be the nodal point for continuity of community based activities.

4.3.2.4 Community Participation Models

a. Village Committee Model

The Netherlands Assisted Program in Karnataka, involved Village Committees at the local level (as compared to being part of the *Gram Panchayat*) to provide direct functional partnership in project activities. Such Village Committees comprise members representing the various sections of the village community, traditional leaders, members of the *Gram Panchayat* living in the village and representatives of village institutions like youth clubs, women's groups etc. The Village Committee was directly responsible for the planning and implementation of project activities in the villages in collaboration with the support of *Gram Panchayat*. To perform these functions equably, Village Committees acted as the representative of the village community, with members selected democratically after considering their competency, dedication and motivation. With the help of trained Village Committees, it was possible to promote effective dialogue and to articulate the interest of communities in implementing and managing the project interventions.

b. Village Water and Sanitation Committee Model

With a view to achieve community participation, GoK issued an order, institutionalizing the formation and functioning of VWSCs. Under this, all rural water supply schemes require formation of VWSC as a pre-requisite to plan and implement a new water supply scheme in their area.

Formation: To perform the functions equably, VWSCs are formed at the village level by the *Gram Panchayats* based on the guidelines issued by the Government. In ideal situation VWSCs or Village Committees should be the representative of the village community social structure, with members selected democratically after considering their competency, dedication and motivation. With the help of trained VWSCs, it is possible to promote effective dialogue and to articulate the interest of communities in projects. In order to enable VWSCS to properly exercise their functions, they require appropriate project support, including the required financial resources.

VWSC composition and selection: Currently, the VWSCs are formed based on the directive of the GoK. However, the role of *Gram Sabha* in identifying/selecting the members to the VWSC is not very clear.

Functions of VWSC: The VWSC is to be involved in all stages of the project cycle i.e during project identification, needs analysis, planning and implementation

including tendering process etc. in keeping with the preceding principles of community organization, partnership and participation. The following functions have been entrusted to VWSCs:

- formally represent the community in all dealings of the project;
- coordinate necessary community involvement in project villages and be responsible for the preparation of Community Action Plan;
- coordinate with the project for all investigation, planning, design and promotional activities concerning water supply, environmental sanitation, hygiene education and other community related components;
- direct the planning, organization and implementation of community environmental sanitation activities with project guidance and support;
- responsible for the storage, use and distribution of materials provided by the project for community built project works;
- monitor the progress of all village work and especially that involving community members;
- support the acquisition of land for water supply facilities;
- responsible for the effective use, operation and maintenance of community water supply and environmental sanitation facilities;
- organize (and manage) the collection of tariffs and funds for the operation and maintenance of water supply and as necessary, environmental sanitation facilities;
- promotion of basic rights, responsibilities and desirable behavior concerning water use, use of sanitation facilities and the maintenance of a hygienic village environment.

Danida assisted *Jalnidhi* project used the VWSC model with some refinements. Under this empowerment of rural community was used as an instrument of change. Constant support from advisory group of Danida was provided.

Effective and reasonably comprehensive community participation is the primary deciding factor for the success and operational sustainability of Water Supply and Sanitation programs. Experience over recent years demonstrates that communities are willing to pay for improved water and sanitation services, which they find acceptable. For this to occur, an adequate range of technical options together with associated service conditions and costs must be identified and made available. In this way the necessary prerequisite for participatory program success are transparency, mutual respect, frequent interaction with the community and sharing of the right information.

2. **Community Contracting**

The implementation of the Rural Water supply schemes under GoK and ARWS Schemes is being done by the ZP Engineers. They assist the VWSC Chairman in calling for Tenders and the contracts are approved by the Executive Engineers. Therefore full empowerment of the GP and VWSC is yet to be carried under the Gok and ARWS Schemes. Further, the involvement of VWSC members almost does not exist and the schemes could be aid as prerogatives of the engineering section of the ZP. However, with GP empowerment, at some places, VWSC members are being involved in supervision and contract management with due assistance from the ZP Engineering Wing. For successful implementation, continuous training and awareness to the stake holders is required to exercise their rights.

Under *Jal Nirmal* Project the community has been entrusted the powers of decision making. SAs have been provided to assist them and provide technical know how, data and support

services. The role of ZP Engineers is simply supportive and more in administrative implementation. In view of these, most of VWSCs were found to be active in project implementation. Uder he project, nine types of procurement contracts (W1 to W9) could be followed by community/VWSC including W6 (community contracting). To encourage local level community participation and indirectly build their capacities, GoK used the concept of community contracting. Under this (termed as W-6 Contract), if the cost of the water supply scheme under implementation is less than 23 lakhs, then procurement from village community was possible and the community could take up all the construction activities. Under *Jal-Nirmal project, this* has been practiced in many projects of rural water supply, drainage line development etc. However, capacity building for post implementation period is lacking under the W-9 procurement and it is reported that VWSC/community was divided on the question of modification of contracts. The SAs, working on the project felt that more active participation is required by ZP staff in project implementation.

3. Issues in Community Management (Field Observations):

1.. Awareness Levels

The awareness levels about the reform processes and programs among the community were generally observed to be good. Out of 28 habitations surveyed (besides Chikamaglur) across various districts, more than 70% people in most habitations have known about such programs and were also conversant with the capital cost sharing concept. However, specific project details etc. were not known to the community. However, only about 42% respondents have attended any village meetings regarding projects planning, implementation or related discussions.

4.3.4.2 Community Decisions on Technological Options

Presentation of technology options to the community formed an important process of empowerment of the community. Such a process also indicates the internalization of demand driven approaches. However, except under *Jal-Nirmal* project this practice seemed to be absent. Even under *Jal Nirmal*, the concept needs improvements and requires better perspective. In most cases, VWSC, not the full community, was provided with only "two" technological options. A close scrutiny of detailed project reports (DPRs) indicate that even the offered options were not very much different. Only about 24% individual respondents of *Jal-Nirmal* villages, confirmed discussions on these limited technological options. However, in about 8 villages (out of 34), the respondents confirmed that the decision on type of scheme was taken by VWSC members.

4.3.4.3 Representative-ness of VWSCs

From the discussions, it was revealed that in most cases, VWSCs was formed by persons belonging to small groups (affiliation to Chairman, GP etc.). During formation, most of the community people were not consulted in the process. Further, most of the community members were generally not aware of the major decisions including scheme plans, technological choices etc. Due to VWSC belonging to a select group, there was low participation as well as interest of community in their deliberations except in meetings called for setting water tariffs.

In conclusion, the constitution of the VWSC mirrors the *Village Panchayat* (all ward members are members) and the social and economic equations, which influences popular political representation were observed to be present in this institution also. The observations further indicate that the inclusion of poorer and marginalized communities is not explicitly aimed at and thus the VWSC has also been influenced by the prevailing political equations.

4.3.4.4 Community Contribution and Community Ownership

Capital Cost Contribution: Cost sharing by community was initiated in the KIRWS & ES project in 1993, where community contributed 30% the cost of the environmental sanitation. They also contribute operation and maintenance cost of water supply by paying the water tariff as well as the entire management responsibility. Danida projects started with 30% cost sharing of latrines followed by 5% capital cost contribution for water supply from 1996 onwards. There was no cost sharing for either water or environmental sanitation components in the Netherlands assisted projects.

Currently, the 10 percent capital contribution (with the exception of the RWS supported by GoK) finds blanket application across GPs and Villages. However, there is no process to ensure that these pertain to least life-cycle cost schemes. Therefore, possibilities of over-design/provision (although calculations take the conventional population projections) and/or actual accessing services by less (than population used for projections about lpcd norms) number exist. There are no guidelines on the potential graded capital contribution (rich pays more and poor pays less) in cases, where the scheme cost exceeds the least cost/norm. Further, whether contributions in kind are acceptable, needs further clarifications. Similar issues are also noticed during the O & M stage.

Similarly, over emphasis on community contribution, particularly monetary, typically has a negative influence on the quality of CPM dynamics. The active participatory involvement of beneficiaries does indeed slow down physical implementation, but experience shows that this is only in the beginning. The initial slow start is offset by better use and maintenance of completed water and sanitation facilities.

There seems to be a lack of clarity on the process of mobilizing the ten percent capital contribution. While the guidelines seek this to build ownership among the community, there are multiple signals going out in the state. It needs to be examined whether the ten percent contribution alone, is adequate to build local ownership as the process of collection of this amount is inadequately codified and understood by the implementers and the designers of the program.

The contribution from users towards the capital cost (steady at ten percent across the districts and GPs) is being instituted in the sector reform districts and the externally aided projects to increase stake and ownership feelings of users. While the implementing agencies are clear that this contribution has to come directly from the users, during the visit it was realized that other sources are also allowed to be tapped (donations from social as well as commercial organizations etc) thus diluting the ownership concept. Experience demonstrates that a percentage contribution stipulation also at times induces hazardous behavior (e.g. contractor or third-party funding community contribution). On scale up of implementation of *Swajaldhara/SRP*, such tendencies will need to be controlled.

Local dynamics pertaining to coverage of different sections and the ability of some to tap the scheme on account of their higher ability to pay or greater access to information are inadequately understood. Part of this is due to the management of the entire process by the traditional power centers and relationships represented by the GP/VWSC, *taluk* and the ZPED officials. Low involvement of socially sensitive agencies such as NGOs in the program is a limitation to availability of information on the process of demand generation and the scheme's ability to respond to demand emanating from different social and economic groups.

The limitations of assessment of demand merely by a financial contribution are empirically well documented in the earlier World Bank assisted project and the *Jal Nirmal* program. The inadequate documentation of the process of collection of this amount, in terms of socially disaggregated information about the source of the contribution and the flow of the benefits, coupled with absence of measures such as a per capita investment norm or mechanisms to ensure different levels of services and costs, is amenable to misinterpretation and misutilization.

In the Jal Nirmal and SRP/Swajaldhara districts, community contributions are mandatory and the scheme is handed over to the VWSC after completion for O&M. The lack of institutional capacities, low levels of information and knowledge on technology options, costs and maintenance implications mean that the community is not fully empowered to make a judicious choice. The institutional design predicates that the control and decisions on fund flow are still fully with *Zilla Panchayat*, owing to its position in the DWSC, role as competent authority advising the DWSC and the Implementation authority.

Under the rural water supply schemes supported by the GoK, water is provided without any community contribution and financing of O&M. While the state government is moving ahead with schemes to tackle the problem areas outside the SRP/Swajaldhara/*Jal Nirmal* districts, there remains the question of how problem areas within the state having excess fluoride in ground water – would be managed. The policy on costs of scheme and O&M responsibilities needs to bear in mind the special situation of quality affected habitations and the current set of guidelines – state and central – are often in conflict in such cases

4.3.4.5 O & M

The message of "the village will have to bear full O&M costs and that the government will not maintain" has been delivered in most GPs and villages but the importance of this message is limited to some GPs and *Taluk* level officers only. Where formed, user and Village level groups have been told to look after O&M fully but not all these groups are clear about the magnitude and details of the O&M costs involved. Inadequate capacity building inputs for user and village institutions has meant that there were no discussions about design options (beyond just public and private provision), or the life-cycle costs of the scheme or how to look after financing of the schemes. By-laws have been made for VWSCs in some cases but their future sustainability will be dependant on their integration with the Panchayat Raj structure and the vibrancy of the latter, an issue that has not been fully addressed by the program.

To overcome the irregular electric supply as well as high energy costs, the VWSC are contemplating to decrease the electricity charges comparable to the agricultural uses (irrigation pumping) and introduce alternatives, such as using solar energy, as an option for pumping.

It is too early to comment on the effectiveness of operation and maintenance of the water schemes in the *Jal Nirmal* project since most of the schemes are handed over within last six months only. It is clear though that the preparatory inputs provided to VWSC members and the information base provided to the VWSCs in order to make informed decisions, has been highly limited. Serious thinking is required on technical and management options in areas with ground water quality problems. The implicit devolution of tariff setting to the VWSCs, needs to be examined in the light of its impact on access to services by the poor, institutional capacity and the ongoing process of constitutionally mandated decentralization.

Still, the inter-relationship of the total cost of maintaining system (a function of the technology selected, source etc.), contributing population, service level, number of connections, economic levels of the community etc. are being explored to assess O&M costs and water tariffs. However, VWSCs do understand that the household service connection user base has to be increased (since, in most cases they are the ones, who make significant contributions) to sustain the O&M of the system. This is still an evolving issue and is likely to unfold in the coming years.

4.3.4.6 Community Contracting

Based on limited experience following issues need to be addressed in community contracting

The community was generally lacking capacity to undertake complex responsibility of contracting.

Considerable training inputs shall be required to ensure the involvement of the community in the procurement process.

The process is cumbersome and there is likelihood of missing the focus.

The Community Contracting may succeed for small schemes e.g. single village/habitation scheme, with a homogeneous population. The concept is yet to be tested for a complex regional scheme involving multiple villages with heterogeneous population.

There are chances of inflating the rates of labor and materials. However, to control this malady, the system of market survey and updated Standard Prices and Schedule of Rates could be the measures. Similarly, capital cost sharing by the community could be used as an effective deterrent, as the community shall have to pay more, if cost is more.

The community contracting in most instances was observed to be as contracting to influential members of the community only.

The heterogeneity in the community creates group of diversified interests.

The vested interests of some of the individuals or groups of the community and officials of DSU/SA may lead to tarnish the image of the community contracting system.

The VWSCs, which represents the community is a sub-committee of *Gram Panchayat* under the *PRI* Act. The VWSC shares the responsibility of operating the funds, managing the stores and procuring goods, works and services. The vested interests in the *Gram Panchayat* may indirectly affect the works of VWSC. The possibility of such eventuality cannot be ignored.

4.3.4.7 PRI Capacity

The planning and implementing institutions are found to be particularly lacking in understanding of processes at the community level – which lies at the heart of success or failure of the current RWS programs, especially the SRP and *Swajaldhara*. These agencies do not currently have the capacity to systematically

engage with households and user groups leading to the formation of VWSCs (and their legitimization or links in respect of PRIs where appropriate).

The SRP and *Swajaldhara* projects are yet to develop capacity building strategies and most of the IEC activities carried out so far have been concentrated upon making people aware of the new scheme for water supply and its minimal rules (10 percent contribution from and full O&M by users). In most of the states, the sequencing of the broad phases of activity enunciated in the SRP guidelines has not been followed strictly and their limited interpretation has led to these being implemented at times without adequate importance to quality, as a one-off input or postponed till later, awaiting guidance and further clarity on the nature of process inputs to be provided.

While there is an apparent clarity about the institutional roles pertaining to the technical/hardware aspects, there is a fair amount of confusion on what activities constitute the software inputs and who is responsible for doing these. This is evident from the relative slow pace of the IEC and capacity building activities in most of the districts and GPs. In other words, the agency predominates the SRP and provides little avenue for participation by other agencies. In areas where these technical agencies do not have capacities (e.g. IEC, village level mobilization, capacity building), these processes are often ignored, postponed or undertaken not fully in the spirit of the guidelines.

The discussions with VWSC members and decisions reached by communities so far point to the risk of mis-targeting (exclusion of the poor from the new provision) and capture by the rich and above middle income groups (provision of more than supplynorm enjoyed by the households who will pay for individual household connections). This also runs the attendant risk of political re-appropriation induced by political pressure or potential scheme failure.

Currently the SRP/Swajaldhara leaves the appropriateness of community level (implementation and user) institutions to the discretion of the districts. However, local government capacities will become a constraint to institutional sustainability in the long run. Therefore, wherever possible, SRP activities need to be linked to parallel efforts in strengthening local government institutions. Likewise, there was no clear enunciation of how the village institutions are to be empowered to manage the responsibilities for the future - capacity building needs and an action plan for providing these, IEC strategies and action plan after VWSC formation. Identification of capacity building needs and a strategy to fulfill these with time frames should be ideally in place before handover. While the RGNDWM guidelines indicate IEC and capacity building to present and make capable the addressing of issues in a holistic manner – sustainability, integrated planning etc., most of the activities have been focused on making the people aware of a scheme for water supply and its minimal rules (10 percent contribution from and full O&M by user communities).

Even though decentralization has been talked a lot there is a tendency to impose rules and regulations from the top in view of the conflicting interests and conditions of external donors while sanctioning projects. The institutional reforms are good if it can be channeled through the existing institutional environment, resources and skills available locally, at village and habitation level. More often wrong justification is made by experts or consultants without assessing the local need and capacity to deliver things in the prescribed time frame. Any new actions will take time to implement at the local level and hence more weight should be given to interpret the guidelines to the community in a slower and steady pace. The field observations raise some doubts about the capacity (or effectiveness) of the support agencies in catering to the needs of the specific localities. It was noticed during field visits that SAs need to still do much more in social mobilization, social management principles as well as equipping the community/VWSC to take over the tasks, including the overall management and realization of full cost. The present efforts raises questions on even the SAs capability.

Training and capacity building has not been given the due importance and in some cases, have been practically kept out of the sequence of activities implemented. The capacity-building component within the detailed sequence of activities is a continuing process and needs to have a different focus at each stage. For instance, the users need to be provided with information on technologies, capital costs, operation and maintenance, replacement costs etc. and informed about various possible issues, which are associated with each technological choice. Ideally, this walk-through needs to be done during the sensitization and identification phase, before the formation of a VWSC and decision on the scheme. In addition, training in management - record keeping, financial planning, contracting etc. - need to be provided before implementation is undertaken. Capacity-building initiatives to facilitate sound operational and financial management by the village committees is lacking. Currently, these are not provided at the necessary juncture and contracting/ supervision continues to be managed by the ZPED on behalf of the village institutions. This does not augur well for sustainability of the village-level institutions. It is not sure whether there is a clearly articulated and structural strategy for capacity building at the village/GP/TP/district/state level.

Capacity building of the user groups and the VWSCs is critical both for the appropriate choice of systems and their future viability. This activity demands specialized skills in the areas of group dynamics, negotiations, financial management, an understanding of ground water conditions, challenges and basics of technical design, and contract management. To realize the full scope and intention of the capacity building component, a rigorous assessment of the capacities of the Support Agencies to provide such training is required. It would be a challenging task for DWSM, in its current form, to provide this range of training inputs.

In many cases, the GPs and districts do not have a clearly articulated RWSS policy, beyond the compliance to State/nationally accepted prioritization by coverage and quality. This is compounded in many instances by the lack of acceptance of the reform principles at the policy and political levels in the districts and GP levels. The RDPR/KRWSSA needs to take account of the differing levels of importance accorded to sector reforms sector across districts and consider developing a basic minimum agenda for districts/GPs to ratify in their DWSMs and other lowest bodies.

4.3.4.8 Sustainability in Project Management

The sustainability of operations will be dependent on the ability of VWSC to maintain the system. However, the current drinking water supply provisions at village level will be financially sustainable in most cases if the VWSC is able to canvass and provide sufficient household connections. If water availability can be ensured by VWSC, households opting for private connections would be willing to pay for the services. Similarly, lack of information with the VWSC members on the costs and the absence of discussions on the financial management and planning aspects mean that a realistic appreciation of this issue by the community is limited. The current preference for piped water supply systems and the plans to cover O&M fully would mean that the poorer households are possibly left out of these enhanced provision arrangements. The possibility of the poorer households opting for group connections and the supply and cost recovery details need to be explored and tested.

Sustainability of the program – from a water resource or financial resource point of view – is still an unanswered question. While no initiatives are visible on the water conservation front, the implications of future investments by the VWSC (replacement or emergency repair) have neither been worked thoroughly nor understood fully.

4.3.5 Other Management Issues

VWSC terms are coterminous with the GPs. This means that there is going to be a vacuum each time of the GP election takes place. The VWSC are to be reconstituted by he new GP and this means that new GP and VWSC members have to be trained to take over all the functions including the O & M. While VWSCs have been perceived as an important institution, their limited term restrict any long term vision and action for VWSCs. This also restricts to build institutional memory within the village level institutions. This issue has to be looked in to cautiously in the operation, management and maintenance of the water and sanitation facilities constructed in the villages.

The transition from old VWSCs to the new VWSC: after the GP election. In many places VWSCs are not reconstituted or meetings are not regularized. Several of the newly elected members are not aware of the project details and their roles and responsibilities. It is time to critically review the composition of VWSCs and make appropriate modifications while incorporating new selected members from the village;

The **documentation of and compilation of information** is rather weak in several of the DPUs, GPs and support agencies visited. According to the information provided there is an IT and monitoring and evaluation section functioning in the *Jal Nirmal* project districts. However, for the study purpose, neither the state level or the district level units, were able to provide any record on capital cost contribution, O & M, number of trainings conducted etc.

The overlap between the *panchayat* and the VWSC is positive, integrating a body with management responsibilities with the constitutionally mandated local entity. However, in most villages the VWSC relies on its own members, rather than paid employees, for operation of the system. Moreover in many schemes (visited by the sector study team) VWSC functions as a "dummy" structure and the decisions are taken by the GP President and the Secretary. More broad based training, with greater involvement of user groups, may aid the sustainability of current arrangements in the event of a change in the constitution of the Panchayat (and the VWSC) after elections. There is the need for training of VWSC members on their roles besides management aspects of O&M – financial and technical. There is a lack of sufficient information amongst the VWSC members on the options, costs and modalities for providing individual connections, group connections etc.

The decision of becoming a beneficiary of the project is taken by the GP before the formation of VWSC. This shows that no serious thinking process has gone into the grass root level planning and assessment by the people residing in the localities rather than the conventional decisions of the politicians and elected representatives. This participation means mobilizing people to approve or accept a project, which has been agreed and planned for them by the Government and the donor. More over VWSC is not an autonomous body and it is working as an implementing agency of the project at the village level.

The influence of MLA and MP funds supported schemes in the villages is still negatively affecting the institutionalization of social/community management in RWS and its long term sustainability. It is mandatory to make capital cost sharing and full O & M cost in all RWS.

Suitable legislative orders have to be introduced to streamline the process and establish uniform regulations in the RWS sector.

Observation based on the Field visit to Netherlands Assisted Project Morab, Dharwad

The Morab water supply project covers three villages under two GPs. The scheme was initiated in 1993 and was handed over to the GP/VWSC on 29.9.2001. It was informed that three independent VWSCs are functional here, but the records of each VWSCs were not available in the *Gram panchayat*. The current VWSC team is not aware of the extent of community awareness, mobilization etc. carried out by the NGO. The Secretary, GP is with the GP for more than 8 years and is an engineering (BE) graduate, seems to be very active and knowledgeable. The observations indicate that the Secretary, GP guides and manages all the schemes and seems to be very influential politically also. He belongs to the same village/locality. Even though, the Secretary was cooperative he was not supportive enough to provide the extent of the involvement of NGO intervention in this area. The GP Secretary even stated that "NGOs were not cooperating with the Gram Panchayat".

In the beginning of the scheme, water supply was provided for 24 hours a day. The scheme had a Generator for backstopping and that was to be used regularly. As a result the O & M cost started increasing and finally it was decided to regularize the water supply to limited hours. Due to high O & M cost currently water is supplied on alternate days and some time once in three days.

The GP has four existing schemes. The details of the schemes are provided below:

- Morab: An OHT of 3.5 lakhs litres was constructed under the Netherlands scheme; later on another OHT of 50,000 litres was added under ARWSP; 470 house connections and 75 public stand posts.
- Thale Morab: OHT of 100,000 litres; 73 house connections and 13 public stand posts.
- Gumbagol: OHT of 125,000 litres; 164 house connections and 13 stand posts

The population for the three villages constituted around 13,500 (about 2290 households). Initially the VWSC charged a uniform tariff of Rs. 30 per month for household connections and Rs. 20 per household for Public Stand posts.

It was also realized that the people residing in the tail ends were not getting the anticipated service level.

Therefore, GP established a Coordination Committee of the three VWSC, but there are no records to indicate, whether this committee is functional or not, No proper records/proceeding books were available.

According to the present O & M plan the annual O & M cost for three VWSCs was Rs.6.4 lakhs. The common expenditures are shared by the 3 VWSCs and individual villages meet the operational cost of the distribution network. In 2000-2001 and 2001-2002 the O & M cost was very high and the total deficit for the two year period was Rs. 2,09,215.00.

Table; Annual O&M Expenses

Year Income (Rs)

Expenditure (Rs) Deficit/Surplus	
2000-2001 Nil	
	- 80,000.00
2001-2002 93.155.00	
2, 22,370.00	- 1,29,215.00
2002-2003 2 62 774 00	
2, 83, 010.00	20,236.00
2003-2004	
49, 960.00	1, 83,930.00
2004-2005	
97,535.00	1, 16,555.00

The GP is planning to mobilize income through deposits towards house connection and minimize the number of public stand posts.

The positive aspects are the people are paying for the use of public stand posts. With appropriate technical, management support and guidance it will be possible to make this scheme viable to operate without depending on the funds from the government. The VWSC members and other elected members should be given orientation. Not even a single women member attended or participated in the discussion at the GP office.

The constitution of the VWSC mirrors the Village Panchayat (all ward members are members) and the social and economic equations that have influenced popular political representation will be present in this institution also. The inclusion of poorer and marginalized communities is not explicitly aimed at and thus this institution will be influenced by the prevailing political equations.

Monitoring

It was interesting to observe that no one in the *Zilla Panchayat* is aware of the details of various schemes (except under Jal Nirmal) and it seems no one is responsible for the monitoring of the functioning of the various schemes specially the multi-village schemes. It is mandatory to conduct a functionality study of the multi village scheme mainly to understand the community dynamics in managing the complicated water supply schemes (especially surface water schemes). It may be worthwhile to prepare a case study on the technical and O & M aspects and the role of Coordination committee. The GP Secretary is trying for a water scheme under *Swajaldhara*.

The completion report of the NGO intervention was not available with the GP and the DPU.

According to the GP Secretary 35% of the households have toilets. All schools have toilet facilities.

4.4 Rural Sanitation in Karnataka

4.4.1 Introduction

The concept of sanitation has grown in understanding and perception across the country from being addressed as a simple latrine program to a much wider program addressing issues related to improvement in the quality of life and is now one of the basic determinants of human development index. The importance of sanitation as a contributory factor for the wealth and well being of a nation was recognized and addressed by the government of India way back in the pre-independence period by the *Bhore* Committee and soon after independence by the Environmental Hygiene Committee (1948-49). Sanitation today comprehensively includes a whole range of issues like liquid and solid waste disposal, food hygiene, and personal, domestic as well as environmental hygiene.

For improvement of sanitation in the rural areas of the state, various projects namely centrally sponsored CRSP, externally aided programs of the Dutch and the Danish, the *Jal Nirmal* project of the World Bank, the GoK sponsored *Nirmal Grama Yojane*, *Swatcha Grama Yojane* and the Total Sanitation campaign besides programs supported by UNICEF and *Azim Premji* Foundation as well as Public Private Partnership programs like the *Sarvashiksha Abhiyan* have been implemented in the state. In spite of all these, the progress in Karnataka has been quite slow. According to the baseline survey conducted by the GoK in 2004, the total number of rural house holds in Karnataka has been 6,962,238. Out of these, only 19.40% of BPL HHs and 24.36% of APL HHs were found to have sanitary latrines with an overall coverage of 23%. As per present estimate, about 24% households in the state have IHHLs. Of these, the SC and ST coverage is about 34%.

4.4.2 Evolution of the Rural Sanitation Program in the State

4.4.2.1 Household Sanitation

The issues of sanitation promotion were taken up at the Gol and later at the GoK level as early as the IV Five Year Plan and later during the V Five Year Plan under the 20 point Minimum Needs Program. With the onset of the International Drinking Water Supply and Sanitation Decade (IDWSSD) 1981-1990, there was an evolution in policies and approaches in the sector. The targets of the decade were to provide safe water to all and sanitation to at least 25% of the rural population. The Gol also launched a low cost sanitation program with the help of the UNDP/World Bank. During the period, other multilateral donors supporting sanitation program in Karnataka included UNICEF, ADB and Governments of Netherlands and Denmark.

The rural sanitation program got an impetus in the VII Five Year Plan period (1985-90). The new program aimed at construction of sanitary latrines in all village level institutions like health centers, schools, *anganwadis* etc. Subsequently construction of the individual household latrines under the Rural Landless Employment Guarantee Scheme, Rural Housing projects including the *Indira Awaas Yojana* (IAY) was started from January 1, 1986.

Further, the Restructured Central Rural Sanitation Program (RCRSP) was initiated in the state in 1986. Guidelines were issued, which were later modified in 1991. Under the RCRSP, emphasis was laid on provision of sanitary latrines to SC/ST and below poverty line (BPL) families. The RCRSP program was a supply driven program and the community participation was not the priority. The target was to cover 25% of the population in the VII Five Year Plan. In the same year the Council for Advancement of Peoples Action Rural Technology (CAPART) was established for accelerating the implementation of rural sanitation program through grass root level NGOs.

In 1988-89, UNICEF provided financial and technical assistance for the establishment of the State Sanitation Cells and the State Institutes of Rural Development in selected states including Karnataka.

The **New Delhi declaration** of 1990 came out with a strategy for the decade. Under the strategy, the RGNDWM was established in 1991 and renewed efforts were made towards sanitation. However, only 0.4 million units were constructed in the year. Realizing the poor response, RGNDWM and UNICEF in 1992 organized a National Workshop on Sanitation to share the experiences. A number of sanitation and hygiene education strategies were deliberated upon and later brought into practice. As a result, the momentum of sanitation activities picked up by 1993. In the same year the RGNDWM guidelines were revised. Though, there was acceleration in implementation, the national coverage was only about 20% at the end of the VIII Plan. The coverage achieved in rural sanitation in Karnataka was only 10.4% by then.

During 1993, the World Bank supported Integrated Water Supply and Environmental Sanitation Project (IWS&ESP) was launched in Karnataka. Besides this, the Restructured Centrally Sponsored Rural Sanitation Program (CSRSP) was launched in the state in 1998. The CSRSP aimed at moving away from the principle of state wise allocation of funds based primarily on the poverty criteria to a `demand driven' approach in a phased manner with a view to achieve at least 50% coverage of the rural population, at the national level by the end of the IX Plan period. The program allocated 50% funds for the Total Sanitation Campaign (TSC) and the remaining 50% for allocation based programs. The program emphasized mainly on the people centered approach with a greater involvement of the households. Demand generation was through awareness building and meeting the demand with alternate delivery mechanisms. The total resources required for the implementation of the state delivery mechanisms. The total resources required for the implementation of the State Government on 50:50 basis.

As a new concept the *Nirmal Grama Yojane (NGY)* was initiated in *Mysore* and later extended to the whole state from October 2, 1995. The focus of the program is on hygiene promotion and improvement of living conditions of the rural community. The program is implemented through the GPs. Under the program, GPs are expected to prepare the plans and raise the 10% capital cost contribution.

The results of the base line survey conducted in 1996-97 by the Institute of Mass Communication across the country on Knowledge Attitude and Practice in rural water supply and sanitation suggested that 55% of those who owned latrines were self motivated, whereas only 2% were motivated as a result of the subsidy factor. This revelation prompted the Central Government to consider motivation as a primary factor to bring about attitudinal and behavior change. By 1998, the constitution of the Water and Sanitation Missions at the state and district levels to institutionalize community based water and sanitation program gave the sanitation program the much required impetus. However, the GOK realized that efforts were inadequate and more needs to be done to combat the sanitary conditions given the physical, economical and cultural conditions and practices of the rural population. This prompted the government to look at a novel way of combating the problem and for the first
time it explored an integrated approach of `Total Village Sanitation', which in vernacular is called as `*Swachcha Grama*'' meaning clean village.

In June 2000, the Total Sanitation Campaign (TSC) was launched in Karnataka in a pilot mode in three SRP Districts namely *Mysore, Dakshina Kannada* and *Bellary*. It was envisaged to be completed in 3 years and had household sanitation and IEC as major components. The program was people centered, participatory and demand driven with a focus to improve quality of life and provided higher incentives (not subsidy) for the BPL families. It included provisions for the conversion of the dry latrines into pour flush latrines, community sanitary complexes, school sanitation etc., wherever required. All efforts were made to include the Cooperatives, PRIs, women groups, SHGs, NGOs, CBOs, children and public into the process of bringing about the required behavioral change and hygiene practices at the community/village level.

The GoK has undertaken the promotion of the 'Total Village Sanitation' or the 'Swachcha Grama Yojane' as a unique program, to address the sanitation of the village in totality. The program was launched in October 2000 and consisted of five important elements - *Pancha Sutras*, which were as follows:

- i. Paving of internal streets and roads in the village
- ii. Construction of efficient sullage and storm water drainage
- iii. Provision of community compost yards and removal of manure pits from the dwelling areas of the village
- iv. Provision of smokeless chullahs/biogas for all households
- v. Construction of household/group latrines with individual ownership, community latrine complexes and institutional latrines in schools.

The *Pancha Sutras* further elaborated on the strategies and modalities to be followed in the construction of individual household latrines, group latrines, community latrine complexes, community compost yards and manure pits, institutional latrines and the school sanitation program. The KLAC was chosen as the Nodal Agency for implementation of the program. For smooth implementation, *Swachcha Grama* committees in each village are to be formulated, which works in close collaboration with the GPs and assists in proper implementation of the program.

At GoK level, *Gram Panchayats* and other PRIs at local level are making significant efforts and investments for construction of sullage and storm water drains in their areas besides undertaking asphalting or stone paving of roads. The funds for these are allocated to *Gram Panchayats* under *Jawahar Yozgar Yojana* (JRY) or under the award of the recommendation of Tenth Finance Commission. Under JRY, *Gram Panachayats* have been receiving about Rs 100 crore per annum, which is funded in the ratio of 75:25 between the centre and the state. These funds are transferred to 5673 GPs through *Zilla Panchayats*. Although, the average allocation works out to about Rs 1.8 lakh per GP, yet the funding is higher for GPs with higher population as well as with higher SC and ST population.

Under the award of Eleventh Finance Commission, since 2000-01, the state is receiving about 79 crores per year (total Rs 394.09 crores for 2000-01 to 2005-06) as grants in aid to strengthen PR system. According to decision of GoK from these, Rs 12 per person per annum are provided as share to the GP and rest to the TP and ZP. The grant to the GP must be spent as pooled development fund by combining it with the resources contributed by the GP in the ratio of Rs 50 for every Rs 100 received as grant. The GoK has stipulated that the GPs must utilize these funds mainly for taking works related to rural water supply and sanitation. However, the total funds under JRY and grants under the Award of Finance Commission work out to only about Rs 3.2 lakh per year per GP. The amount is further

distributed amongst various habitations within the GP and therefore not many major works have been undertaken from the funds.

In 2002, the World Bank supported *Jal Nirmal* project was launched, which included the household latrines, school sanitation, drainage line improvements etc. as an integral component of the project. The project is presently under implementation in 11 districts of the state.

Learning lessons from pilot TSC, the RCRSP has now been merged into the TSC program and a modified version of TSC has been launched in the whole state from Oct 02, 2005.

4.4.2.2 School Sanitation and Hygiene Promotion Program

The School Sanitation Program was launched in *Mysore* district by the *Zilla Panchayat* with the assistance from UNICEF in 1995 as an offshoot to the CDD WATSAN strategy. Focus was on the TCCPC (Teacher to Child, Child to Parent, and Parent to Community) approach. With further assistance from the UNICEF, the program was also launched in another 6 districts.

The School Sanitation program became one of the main components of the RCRSP program. Hence UNICEF and the GoK together identified the program as a flagship program. At the GoI level the program became the School Water and Sanitation Program to promote the concept of environmental education and hygiene education. The goal of the program was the realization of child rights. This was the first initiative of its kind in the country. Since then, School Health Program has become part of the Revised Guidelines (1999) of the RGNDWM. The program also emphasized the importance of provision of water supply and sanitation facilities to rural schools. Even in the currently promoted TSC program the school sanitation program has become an important part of the sanitation promotion drive.

School sanitation program under the *Jal Nirmal* Program has two components and is called as the School Sanitation and Sanitation and Hygiene Education program. The target is for all the schools in the program supported districts to have water and sanitation facilities by the end of 2006.

For institutional and financial management, the SDMC is the Nodal organization for the School Sanitation program. The GoK provides the project cost through the SWSM to the GP/VWSSC, who in turn hands it over to the SDMC. The assistance of the ZP Engineers is taken by the SDMC in the construction activities, but the O&M expenses are borne by the schools/communities.

4.4.2.3 Support Programs to the School Sanitation Program

UNICEF associated itself with the school sanitation program in providing support to the software component. A number of models were built and trainings were imparted to the teachers, masons and support was also provided to the State and District administration in planning and strategizing the implementation.

The Sarva Siksha Abhiyan (SSA), was launched by GoI in 2001 across the country, addresses issues of quality education and supports the provision of toilets and drinking water facilities in the rural schools of the country. The on-going program started in the country as well as in Karnataka in 2001.

Similarly under private initiatives, the *Azim Premji* Foundation has been supporting school education program in North East Karnataka (with sanitation as a component) and is

operational in 17 blocks in 7 Districts. The foundation is not directly involved in the hardware component.

4.4.2.4 Linkage Initiatives for Rural Sanitation

These initiatives were taken to develop a promotion and implementation linkages with other agencies. Major initiatives include development of Sanitary Marts and *Nirmiti Kendras*.

Sanitary Marts

Rural sanitary marts are outlets providing materials for construction of not only latrines but also other sanitary facilities required for individuals and families in rural areas. It is a commercial venture with a social objective. However the establishment and the functioning of these RSMs is yet to reach the expected levels. Reasons attributed were the exposure of the beneficiaries to a wider range of options available in material selection as quite often the construction of the latrine is also associated with 'prestige & a life time investment'. Closer access to markets, convenience, better marketed consumables have also contributed for the beneficiary to look elsewhere. The RSMs themselves today have had to go through a face change to compete with the 'Super markets'. The success of the 4 RSMs in Mysore has been its close link up in functioning and coordination with the Nirmiti Kendra and the NGO, MYRADA which has a long history of association and credibility in the state.

Nirmiti Kendras

Nirmiti Kendras as production centers are the means to improve production of cost effective affordable sanitary materials. NGOs/SHGs, women organizations and Pancayats have been encouraged to open and manage these centers. The production centre manufactures sanitary castings and materials like blocks, doors, ventilators, phenol, soaps, detergents etc. The outlay for the center should not be more than Rs 35 lakhs or 5% of the total funds allocated and is on a Gol/GoK 80:20 bases. One of the most successful *Nirmiti Kendras* has been in Mysore which has 2 production centers and works closely with the Rural Sanitary Marts and MYRADA (a NGO).

5.. Other Sanitation Promotional Measures

Nirmal Grama Puraskar

To encourage the GPs to promote the concept of sanitation vigorously in their villages the Gol under the TSC declared the *Nirmal Grama Puraskar* award. The award acknowledges the best performance and gives a certificate. GoK is yet to apply for the same.

Nirmal Grama Patrike

With the intention of keeping the state and district officials aware of the latest development in implementation of the reform initiatives, this e-newsletter was introduced in June 2004,. The state agencies and districts should give their e-mail IDs for direct access and circulation of success stories. The officials are aware of this but are yet to make use of this facility efficiently.

4.4.3 Unit cost and subsidy for IHHL

Under the CRSP, the least cost option for a sanitary toilet varied from Rs.650 to Rs.1000/and the government subsidy was up to 80% for the BPL families. Similarly, under the NGY, the BPL families were given a subsidy of Rs.1650 (later revised to Rs.2000) and others (APL) were provided Rs.1, 200. Under the TSC, the same least cost variation, as adopted under CRSP (from Rs.625 to Rs.1000) has been maintained. However, in the *Jal Nirmal* project the least cost has been fixed at Rs.1200 for APL and Rs.2000 for BPL families. The beneficiary (under CRSP, TSC, *Jal Nirmal*) is expected to initiate work and on completion and submission of expenditure statement could receive the incentive (not subsidy). However, across the state the final cost on completion was found to be much higher than the allotted amount. This was mainly because the beneficiaries adopted variations during construction i.e. addition of a bathroom, permanent superstructures etc. Table 4.4.1 presents the contribution from government for different IHHL units under TSC

Cost of basic low cost unit, Rs	Share					
	G	ol	S	tate		НН
	BPL	APL	BPL	APL	BPL	APL
Upto Rs.625, single pit	60%	Nil	20%	Nil	20%	100%
Between 625-1000	30%	Nil	30%	Nil	40%	100%
Above 1000	Nil	Nil	Nil	Nil	100%	!00%

Table 4.4.1 Share of different stakeholders in Construction of IHHL under TSC

Source: Guidelines on CRSP-TSC, Gol-January 2004

4.4.4 Achievements under Various Programs

4.4.4.1 Centrally Supported Schemes

Current Status of the TSC Program in the State

The typical cost of total sanitation for a village having about 500 households is presented in Table 4.4.2

SI.N0	Sanitation Component	Cost per HH, Rs	Cost 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	HH latrines subsidy (1600x250)	160.00	4.00
5	Improved Chullahs subsidy for 500 HH	20.00	0.50
6	Community Latrines	40.00	1.00
7	School sanitation	20.00	1.00
8	Institutional Support/IEC	20.00	0.50
	Total		30.00

 Table 4.4.2
 Cost of Total sanitation for a Village of 500 Households

Source: PMU Unit , RD & PR

The detailed physical and financial progress made under TSC, in the three Pilot Districts, is presented in Table 4.4.3 and Table 4.4.4. However, during the 3 years of target time, the achievements for the three districts are below 30%, with Mysore being the best performer. Where, about 50% individual toilets could be constructed as compared to only 8-10 % in DK and Bellary. Similarly, in Mysore, the total number of schools targeted, were 2040 but about y 1730 could be provided sanitation facilities, which includes 1133 under TSC and 907 under various other schemes viz., SSA/UNICEF etc. The performance in other two districts in schol sanitation and sanitary complex development was satisfactory.

During 2005, the TSC program has been extended to all the districts and Rs.10 lakhs have been released to each district for conducting Base Line Survey (BLS) and preparation of project implementation plan (PIP). As of now 8 districts, Belgaum, Chikmagalore, Chitradurga, Dharwad, Hassan, Mandya, Shimoga and Udupi have completed the BLS and submitted the PIPs. The survey and PIP preparation is in progress in the other districts

Table	4.4.3 Physical Achievements under TSO	0	as of Sept.2005			
SI.	Activity Details		Districts	;	Total	
No.						
		DK	Mysore	Bellary		
1	Household latrine, target, Nos.	41019	45000	100000	186019	
2	Household latrine, achievement	3278	23042	10340	36660	
3	Sanitary complex, target, Nos.	55	10	50	115	
4	Sanitary complex, achievement, Nos.	34	1	38	73	
5	School latrine, target, Nos.	430	2500	900	3830	
6	School latrine, achievement, Nos.	400	1133	777	2310	
7	Anganwadi latrine, target, Nos.	57	20	825	902	
8	Anganwadi latrine, achieved, Nos.	31	23	427	481	

	Table 4.4.3 Phy	sical Achievemer	nts under TSC
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Source; KRWSSA Report 2005-06, GoK

SI. No.	Details	DK	Mysore	Bellary	Total
1	GOI Share	125.94	443.98	188.12	758.04
2	GOK Share	46.95	152.27	157.41	356.63
3	Interest	13.43	24.94	23.72	62.09
4	Beneficiary contribution	25.12	46.40	39.12	110.64
5	Total Fund Availability	211.44	667.59	408.37	1287.40
6.	Gol share Expenditure	125.94	241.18	188.05	555.17
7	GoK share Expenditure	46.95	101.23	156.65	304.83
8.	User Share Expenditure	17.53	52.16	39.12	108.81
9	Total Expenditure	190.42	394.57	383.82	968.81
10	Expenditure as % of Fund availability	90.06	59.10	93.99	75.25

 Table 4.4.4 Financial Progress under TSC in Sector Reform Districts
 Rs in Crore

Source RD&PR Reports 2004-05, GoK, Data from RDPR and KRWSSA,

Status as of Sept.2005

The Table 4.4.4 indicates that the total expenditure is about 75% of allocation, but the physical achievements are well below 50%. The high expenditures can be attributed to increase in the cost of materials due to delays etc.

Achievements under Nirmal Grama Yojane (NGY)

Under NGY, the GPs are expected to prepare the sanitation plan and raise the required 10% capita cost contribution. The GP is entrusted with the responsibility of choosing the beneficiary. Under the program, Gram Panchayats were given the responsibility of constructing at least 100 latrines each year. Under this, a cash subsidy of Rs 2,000 for the BPL families and Rs 1,200 for the APL families is provided. Since 1-4-99 the subsidy amount for the BPL has been reduced to Rs.500/- and no provision is made for the APL. However, increased attention has been laid to the IEC component. Provision of latrines to Primary schools with water facilities was also taken up under the program. The progress under NGY is presented in Table 4.4.5. It can be observed that since its inception, more than 10.30 lakh IHHLs have been constructed under NGY. During 2004-05 Rs. 6.05 crore was provided out of which Rs.1.86 crore has been spent towards Rural Sanitation Program.

Year	Financial (Rs. in Crore)		Physical (Nos.)		
	Target	Actual	Target	Achievement	
1993-94	23.27	15.43	9,988	6,409	
1994-95	15.12	49.44	10,903	25,886	
1995-96	42.04	21.80	2,52,208	1,32,140	
1996-97	41.50	22.48	2,82,050	1,63,597	
1997-98	44.31	20.26	2,78,605	1,49,056	
1998-99	36.00	22.98	2,25,824	1,55,148	
1999-00	28.84	19.42	1,54,500	1,27,637	
2000-01	26.44	16.23	1,42,139	94,104	
2001-02	15.62	11.92	83,689	88,330	
2002-03	16.30	11.80	88,013	67,955	
2003-04	7.26	5.41	39,218	32,154	
2004-05	6.05	1.86	30,089	11,587	
2005-06	8.93	*	*	*	

 Table 4.4.5 Physical and Financial Progress Achieved under the NGY during 1993

 2005

Source: RDPR Annual Reports 1993-2005 * Data yet to be released by RDPR

It can be further observed that during 1995-99, the rate of construction was high. However, during the later years, there has been a systematic decline in the number of units constructed. The reasons attributed to this are that during the year 1995, the launch of the Nirmala Grama Yojane campaign, contributed in the required impetus. The provision of subsidy for both the BPL and APL families also contributed in enhancing the adoption. Further, there has also been a tapering of the grants from the GoI with the expectation that the GoK would increase its share. However, as GOk did not increase its share, therefore there seems to be decline in available funds and thus the low adoption. The district wise details are given in Annexure 4.4.2.

The Swachcha Grama Yojane

The program was launched in October 2000 to cover 1300 villages based on the Pancha Sutras. The major part of the finances for the program (80%) is a loan from HUDCO, 10% from the GoK and 10% from the community as contribution. To speed up the activities the GoK has strategically divided the execution of works between the KLAC, ZPED and the *Nirmithi Kendras*.

The estimated cost of the program is Rs.260 crores and 286 works have been completed and efforts are on to complete the program in the selected Districts. For the year 2004-05 further approval of 100 crores has been accorded for the implementation of second phase in 1000 villages with 10% community contribution and works are in progress.

Currently the community contribution has been mobilized in about 500 villages. The program has targeted only the BPL families. The survey results indicate that of the listed beneficiaries, 42.5% are laborers, 35.6% are farmers, 21.9% are petty entrepreneurs and traders. The program proposes to give highest priority to the construction of roads and drains, IHHLs and awareness activities. The physical achievements of the project are Annexed.

CRSP

CRSP had a limited impact in achieving sanitation through IHHLs. Only 1.9 lakhs households were assisted under the program from 1985-86 to 1994-95. In spite of government efforts, the coverage, percentage of success and use of the constructed toilets was low under CRSP. As per strategy paper 2002-2005, the allocation from centre was very small as compared to the demand and the subsidy was available only to BPL households, for whom sanitation was at low priority. Secondly, the weaker sections lacked area required for construction of the toilets.

Externally Aided projects

Under IRWS&ESP supported by the World Bank, which was implemented in 16 districts of the state, about 89,000 latrines were constructed during 1993-2000.

Under Netherlands assisted Rural water Supply and Sanitation project, about 1730 latrines were constructed in 5 districts.

Under Danida assisted Rural Water Supply and Sanitation project, about 5719 latrines were constructed in four districts of Bijapur, Bagalkote, Chitradurga and Kolar.

Jal Nirmal: Under the *Jal Nirmal* project a total of 68974 HH latrines have been constructed and 52377 smokeless Chullahs (SLCs) have been installed. Of these, 63.21 % of HHLs and 60.22% of SLCs have been in Batch I and 29.58% of HHLs and 32.29% of SLCs are in Batch II. The rest of the installations are in pilot villages and *Thandas*

Other Initiatives

The different housing schemes such as *Indira Awaas Yojana* (IAY), Ashrya, Ambedkar, HUDCO has emphasized for constructing sanitary latrines along with the house. As per available data, about 5 lakh dwelling units have been constructed in last 10 years. Assuming that all units have sanitary latrines, it can be said that about 5 lakh sanitary latrines have been constructed I the sate. As a substantial number of such units have been constructed in urban fringes and rural areas, it could be said that about 3 lakh toilets have been constructed in such areas.

Conclusions on IHHL Program

Overall, the 1991 and 2001 census data of Karnataka indicate that the number of households having latrines, were 24 and 37% respectively. During the ten year period, it increased from 63% to 75% I urban areas, whereas, in rural areas it increased from 7% to 17%. The most recent estimate of sanitary latrines indicate 24% coverage in rural areas.

During field visits, the quality of the constructed latrines was observed to be good and the people were satisfied with it. However in few villages the pits were made very close to the house due to space limitations and even the construction of pits (type of honeycombing used etc.) was faulty, which would limit the design period. Most of the latrines were observed to be of twin pit type with honeycomb brick lining.

Overall, the sanitation program is being implemented in the state since 1986. Over the years various programs with variant criteria have been implemented with the anticipation to up the numbers and promote total sanitation. However, the resultant methodology and the approach do not seem to have yielded the required results. Sufficient focus is given to the increasing of numbers but the usage part is not sufficiently addressed. The approach talks about flexibility in approach. However, at the implementation level the choices are few. The fact that the beneficiary has to get the toilet constructed upfront and then receive his share of the subsidy may also be one of the factors for poor achievements.

At the policy level the approach, methodology and the strategies are well defined and understood. However the same level of understanding is not shared at the lower rungs. The feedback mechanism is not well built into the system and as such quite often the actual problem does not get addressed. The crux of the problem does not get addressed and administrative solutions are sought to solve the underlying economic, social or political problems. It is envisaged that the baseline survey proposed will help throw more light on finding better solutions to the problem.

4.4.5 School Sanitation and Hygiene Promotion Program

4.4.5.1 School Sanitation

There are more than 46,900 primary schools and about 89 lakh children in the age group of 5 to 12 years and therefore provision of sanitation facilities at the school is very important. Realizing this, UNICEF supported the school sanitation activities in the Mysore district. Starting in 1992, it has provided both financial and technical support (training of masons) to the activity. In 1995, based on the Mysore experience, strategies were developed for promoting school sanitation in the state. Recognising the importance, the Mysore model was extended to 6 more districts i.e. Bangalore (U), Bangalore (R), Chitardurga, Mandya, Raichur and Tumkur. The extent of coverage of school sanitation with UNICEF support is detailed in Table 4.4.6

SI No.	District	Number of Blocks	Number of Schools
		covered	Covered
1.	Bangalore (R)	1	50
2.	Bangalore (U)	3	274
3.	Chitardurga	3	165
4.	Mandya	1	168
5.	Mysore	7	640
6.	Raichur	3	328
7.	Tumkur	2	278

Table 4.4.6 Coverage under	School Sanitation Prog	ram Supported by UNICEF
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Source: Karnataka SSHE, Overview and Progress

Starting with 2000-01, GoK has contemplated to provide school sanitation to about 2000 schools per year. Under this, separate urinals for boys and girls and required umber of toilets shall be provided in each school.

Costing

The unit cost for the school sanitation according to the RGNDWM guidelines is only Rs.20,000 per unit. However flexibility in approach is also allowed depending on the size and

strength of the schools. The cost of a school sanitation unit, as provided by the GoK, is as follows:

The estimated cost of a unit for a school with the student strength of more than 50 is as follows

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(Amounts to be utilized from 11th finance commission if additional funds required)

The cost per unit according to the SSA is 35,000/-. The unit cost for the schools constructed under the *Jal Nirmal* Project is as per detailed project report.

Under Sarva Siksha Abhiyan (SSA), there is a provision of construction of school latrines. Till Jan 2005, 11,249 school latrines have been constructed under the activity.

School sanitation program under the *Jal Nirmal* Project has two components namely School Sanitation (SS) and Sanitation and Hygiene Education program (SHEP). The target is for all the schools in the program supported districts to have water and sanitation facilities by 2006 end. The present status is provided in Table 4.4.7 and 4.4.8. It can be observed that, under the program estimations for 85 schemes of school sanitation have been prepared for about 30% of the total targeted villages and 37% of the schemes have been tendered, 28% have been awarded, and 25% of the works are in progress, whereas little more than 2% have been completed.

SI. No	District	Target schools	Estimates prepared	Works tendered	Works Awarded	Works in progress	nWorks comp-
							leted
		N	umbers		Numbers	6	Total
	Batch I						
1	Bagalkote	200	146	115	115	115	4
2	Belgaum	341	273	170	115	115	5
3	Bijapur	122	122	63	63	63	0
4	Dharwad	116	78	0	0	0	0
5	Gadag	151	121	23	23	8	0
6	Gulbarga	187	187	140	83	83	10
7	Haveri	271	206	89	89	79	10
8	U.Kannada	199	190	82	20	11	9
	Total	1587	1323	682	508	474	38
	Batch II						
9	Bidar	273	273	36	36	25	11

Table 4.4.7 Status of School Samilation under Jai Nirmai Project as on August 200	Table 4.4.7	Status of School	ol Sanitation	under Jal Nirmal	Project	as on August 200
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10	Koppal	69	56	23	23	3	0
11	Raichur	91	71	0	0	0	0
	Total	433	400	59	59	28	11
	Grand Total	2020	1723	741	567	502	49

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Table 4.4.8 SHEP Progress under Jal Nirmal

as on August 2005.

		HHL	SLC		
District /Batch	Demand	Achieved	Demand	Achieved	
Pilot					
Belgaum	9184	1312	9184	2693	
Dharwad	1124	533	1124	544	
Gulburga	1082	92	1082	386	
Total	11390	1937	11390	3623	
Batch I					
Bagalkot	11805	4675	11805	5837	
Belgaum	27248	6095	27248	10385	
Bijapur	18242	5858	18242	4757	
Dharwad	11363	4358	11363	889	
Gadag	14544	5075	14544	1980	
Gulbarga	18298	4406	18298	2696	
Haveri	25210	6884	25210	2106	
U.Kannada	14117	6250	14117	2891	
Total	140827	43601	140827	31541	
Batch II					
Bidar	24465	15011	24465	5811	
Koppal	7633	3006	7633	5860	
Raichur	5901	2387	5901	5245	
Total	37999	20404	37999	16916	
ITDP					
Gulburga	4378	895	4378	0	
Haveri	2136	1537	2136	297	
Dharwad	298	600	298	0	
Gadag	34		34	-	
Total	6846	3032	6846	297	
Grand Total	197062	68974	197062	52377	

4.4.5.2 Health and Hygiene Education

The component of health and hygiene promotion in the sanitation program is addressed as the sanitation and hygiene education component in the TSC component. The emphasis is on provision of toilet facilities with water supply and hand washing facilities in all the Government schools of the country, coupled with hygiene education. The objective is that children will learn good hygiene behavior and promote the concept among their families and the community, triggering further demand for construction of latrines and working towards a sanitized community. The approach and launch of the program has been quite successful as it has led to a distinct rise in the community.

Promotion of the concept was expected to be carried out through Inter-coordination of various State Government Departments like the Public Health Engineering Department, Rural Development Department, Panchayat Raj Department, Education Department, Health Department, Tribal Welfare, Schedule castes Department and the Women and Child Welfare Department.

According to the data available with the GoK, the incidence of water borne disease in the state shows a downward curve. The guinea worm infestation was eradicated totally by 1994-95. Incidences of Cholera have come down to just 134 cases reported with only 3 deaths by 1999-2000. Though gastroenteritis cases continue to be reported as of 2000 the number has come down to 17,743 with 126 deaths. The State has a record of 23,946 cases and 2 deaths as a result of typhoid.

4.4.6 Environmental Sanitation

The PRED (earlier RD&ED) has been promoting two programs i.e. the improved cook stoves and the bio gas development program, which are expected to contribute to the improved rural sanitation and environment. One of them is the improved cook stoves (smokeless *chullahs*). This program has been in operation since 1983-84. Under the scheme the beneficiaries are provided training and given subsidy for the materials used in construction of cook stoves. The cost of each *Chullah* works out to be about Rs 250 and the subsidy component for the fixed type is Rs.63/- and for the portable type it is Rs. 73/-. The achievement has gone up from 68% of the targeted number to 84%.

The second program is the Bio-gas Development program and is line with the National Program for Biogas Development of Gol, which is one of the programs under the 20 point program. The program is in operation in the state since 1982-83. Under this, biogas plants are promoted by the *Khadi* and Village Industries Commission (KVIC). The GoK has promoted the `Anila Yojane' on similar lines in 1992-93 by providing additional subsidy. The target is the promotion of 6.80 lakh biogas units, of which 2.45 lakh units have been promoted till 2000. The percentage of coverage has increased from 97% to 111 %. The state has received a number of national awards for promotion of these units. Especially Belgaum has got awards consecutively for 5 years. Both the above programs are funded partly by the Center and partly by the state.

The third type of program is the rural sanitation under the Employment Generation Program promoted by the GP to take up the construction of the sullage and storm water drains in the village, asphalting or stone paving of the village internal roads. Funds for these programs are from the GP under the JRY or from the finance from Tenth Finance Commission. The JRY is

funded on a 75:25 ratio between the Center and the State. In all 5673 GP s are involved in this program. The average allocations per GP work out to about Rs.2 lakhs. The finances received under the Tenth Finance Commission are to be used for works related to water supply and sanitation.

Under the *Jalnirmal* project programs like roads and drains, smokeless chullahs, soakpits and the IHHL component are included under the p called as the sanitation and hygiene promotion program. As mentioned in the Technical Manual of the *Jalnirmal* Project the concept of environmental sanitation in the project aims to provide a healthy environment to the community. Provision of adequate sanitation facilities include `safe disposal of sullage and human excreta from the residential houses'. In addition proper collection and disposal of solid waste generated is also important to minimize environmental sanitation. Efforts to overcome and address the issue of open defecation also are considered of primary importance. *Jalnirmal* also promotes the TPPF latrine model for IHHL, institutional group latrines, soak pits, and drains, solid waste, storage, collection transportation and disposal, composting

The environmental sanitation program has also addressed the issue of provision of dustbins and washing platforms to address issues of solid waste disposal and liquid waste disposal. The responsibility of providing these facilities and educating the community on the usage is given to the GPs.

Overall, environmental sanitation is expected to bring about a sanitized village situation. However if the full benefits of the program are to be reaped, sustained measures for inducing behavior change have to be brought into practice. The messages related to the various aspects of sanitation promotion have to be popularized and practiced by the members of the community.

4.4.7 IEC for Rural Sanitation

To create understanding and interest in the community and assist them to utilize the options provided under various sanitation programs, the Government introduced the component of Information, Education and Communication (IEC). Under this, the concept and details of schemes supporting improved sanitation and hygiene is to be disseminated to people using various techniques. It was envisaged that providing information and capacitating people would result in an increased demand for services and an enhanced understanding on the concept of sanitation, which government plans to achieve through a participatory mode.

In the initial stages, before 1990, IEC activities were managed by the sanitation cells created under the RD&PR department and assisted by governmental and non governmental organizations. During early 90s, the IEC activities were stepped up and efforts were made to link up with media like the *Prasar Bharati*. Dovetailing of the program with other government programs like the IRDP, IAY, JRY was also stressed. Women's groups like the DWCRA, Self help groups, NGOs were also made to actively get involved in the program. PHED as a lead agency, undertook campaign activities supported by enrolment of additional professional hands. Massive awareness programs at District, GP, and *Hobli* level were taken up to orient the elected PRIs and the community on aspects of sanitation. UNICEF assisted in the training of about 10,600 masons on technology of the Twin Pit Pour Flush Latrine (TPPFL) and also provided them with a set of necessary tools.

Currently, the newly established Communication Capacity Development Unit (CCDU) under the KRWSSA is made responsible for the same. The State level HRD and IEC Cell supported by the Government of India during the 8th and 9th Plan period have now been discontinued and their assets and unspent balance has been transferred to the CCDU. Amount earmarked for the IEC is more than 15% of the sanitation sector outlay on a 80:20 basis between Gol and GoK. The CCDU is also responsible for the HRD activities and details are discussed under "Capacity Building".

Under the *Jal Nirmal* project, the IEC activities are managed by the KRWSSA. The IEC messages mainly focus on sanitation and hygiene promotion and are disseminated through various modes of communication. The details of such activities are presented in Table 4.4.9

SI. No	Communication Method	No. of Programs
1	Video film shows/cable TV shows	3391
2	Audio Programs	1876
3	Folk media presentations	1997
4	Folders	240208
5	Posters	48426
6	Book labels	55488
7	Booklets/Brochures	30580
8	Manuals	323
9	Wall paintings	2568
10	Jathas	1189

Table 4.4.9 IEC Programs Undertaken in the Jal Nirmal Project Districts

Source: Annual Report 2004-05, KRWSSA

In addition to the above, mother's meetings and SHG meetings are used as platforms for information dissemination especially on sanitation and hygiene promotion practices. New initiatives like the model village, regional sanitary marts (RSMs) to foster the supply chain are also used as channels for creating awareness.

Considerable efforts and substantial financial resources have been invested in the promotion of IEC in the state since 1986, when the CRSP program was launched. The nomenclature IEC is used at all levels to interpret various concepts from simple material preparation to campaigns and capacity building efforts. However, if the outputs against the inputs are compared, it becomes obvious that the results are far from satisfactory. Current statistics shows that in spite of various schemes, the sanitation coverage is only at 16.5 lakh toilets (24%) and no major improvements in the awareness levels of the community were reflected towards improved sanitized living conditions.

Discussions and field visits across the districts with implementers and the community reiterated the fact that the IEC concept was well thought out and incorporated as part of the sanitation program but suffered due to lack of clarity in conceptual understanding, strategizing and implementation. The promotion of the concept also got low priority and was handled as an add-on, by personnel who were not fully qualified and trained. The lack of clarity and absence of proper guidelines from Gol further slackened the pace. Assessment of performance, both by the Gol and the GoK, against the financial disbursement and not against the outcomes contributed to the stalemate.

4.4.8 Rural Sanitation Monitoring

To ensure the success of the sanitation program the need for close monitoring of the program from the state level to the community level was envisaged. The initial programs like the CRSP was being monitored through the sanitation cells at the state level, ZP engineers and GP Secretary at the village/community level. The State Institutes of Rural Development were also established to provide the required support. The TSC program has been implemented under the supervision of the Karnataka Rural Water and Sanitation Agency

(KRWSA), which is the lead sector institution of the government and will function as the SWSM at the state level. At the district level the respective *Zilla Panchayats* function as the DWSM working through DWSC and DSU. Currently a CCDU unit is established in the state which provides the required support for planning, awareness building and HRD support to the TSC program

At the *Taluk* level the TWSC assists in effective implementation, supervision and monitoring. At the GP level the GP secretary monitors the progress and sends the progress report to the Executive Officer (EO) of the *Taluk Panchayat*. EO reviews physical /financial progress of each GP compiles information for the Taluk and sends it to the CEO- for district level compilation and later on to the KRWSSA/ RD&PR. At the *Taluk Panchayat* level a **'Task Team'** has been formed with staff on deputation from the Education department, Health department and the Women and Child Welfare Department. This team is imparted training and given the responsibility of educating, campaigning and promoting the TSC concept across the villages, working closely with the GP Secretaries. Annexure 4.4.3 and 4.4.4 provides the details of progress of sanitation for all the Districts.

4.5 Institutional Arrangements and Legislative Framework

4.5.1 Introduction

The institutional and legislative framework defines the boundaries and operational limits of various institutions involved in water management and its utilization and ensure sustainability of water resources, efficiency in their use and equity in its distribution amongst all sections of the society. Although rural drinking water requirements are comparatively very small as compared to overall water needs, the sector cannot be understood without understanding broad institutional and legislative framework in the state with focus on water use, resource development, conservation and management. The broad institutional framework engulfing the operational aspects of water resource exploration and development, conservation, management and use and the legal framework at the state level are summarized as under.

4.5.2 Institutions Involved

Water is a state subject as per Constitution of India and therefore its development, conservation, use and monitoring rests with GoK. Several central/state government departments, agencies and institutions as well as community organizations, NGOs etc. are involved in water resource development, use, monitoring, regulation and management. A brief description of the institutions involved along with their roles and responsibilities are described below:

- Water Resources Department: The department has been entrusted with tasks of collection of Hydrological Data, compilation, processing and hydrological designs, planning and investigation of major and medium irrigation projects, construction and maintenance of on-going and existing major and medium irrigation projects, resolving inter state water dispute problems, command area development activities, research, development and training works, maintenance and monitoring of machineries in the department, monitoring & evaluation of irrigation projects etc. During recent past, minor irrigation has also been brought under its ambit.
- Irrigation Department, GoK: It has the primary responsibility of planning, development, construction, operation and maintenance of major and medium surface water sources within the state. Of late, they are managing minor irrigation works also.
- The Rural Infrastructure wing and *Panchayat Raj* Engineering Department within RDPR are also engaged to a limited extent in minor irrigation works (more

specifically on de-silting and development of tanks) in the state with the help of *Panchyat Raj* Institutions (Ref: Annual Report, 2004-05, RDPR, GoK).

- The major water use in the state is for Agriculture, Horticulture, Animal Husbandry, Fisheries, Urban Water Supply and Sanitation (Urban Local Bodies, Water Supply and Sewerage Boards etc.), Rural Water Supply and Sanitation (RDPR including PRED and KRWSSA), Industries, Power Generation (Energy) etc. The respective state departments are thus the major stakeholders in water use.
- The major water monitoring departments are Groundwater Department (under Department of Mines and Geology), Karnataka State Pollution Control Board (water quality), Irrigation Department (surface water sources) and Central Ground Water Board. These departments are further supported by Karnataka State Remote Sensing Center, Bangalore.
- Other state agencies/projects active in the water sector are: Department of Watersheds, Desert Development Program (D.D.P), Drought Prone Area Development Program (DPAP) etc.
- There are a large number of organizations, science/engineering colleges etc., which are engaged in developing and disseminating various technologies for water conservation, effective and efficient use of water as well as in improving quality of available water.
- There are a number of water quality laboratories in the state (Department of Health, Science/Engineering/Medical colleges, private sector etc.), which are conducting water quality analysis for a few or all water quality parameters, required for a specific use.
- Besides this, there are a number of community based organizations like Water users associations (WUAs), Watershed Associations (WAs), Village Water Supply and Sanitation Committees (VWSSCs) etc. working in the sector.
- NGOs, CBOs etc. are also engaged in disseminating information on water use, conservation, and management. Of late Self Help Groups (SHGs) are also getting involved in these activities.

From policy considerations, the state water policy in line with National Water Policy, 2002 also provides first priority to drinking water supply. Which, indicate that from water availability considerations, there are "apparently" no major issues between irrigation department and departments engaged in water supply. However, lack of coordination, procedural delays in approval etc. due to difference in prioritization of projects and exploitation of sources etc. exist at project implementation level.

However, at village/GP level, with multiplicity of organizations, overlapping roles and responsibilities etc., the clarity of the specific roles needs more elaboration. Due to political reasons, most of these local level institutions have same/similar functionaries with Chairman (*Adhyaksha*), GP being the focal decision maker and the GP, secretary being the major fund management and controlling authority. As a result, the implementation may not bring in the required community participation and desired impacts.

4.5.3 Institutional Mechanism in RWSS

At the GoK level, the responsibility of rural drinking water supply is vested with RDPR, which is managed by Rural Infrastructure wing, KRWSSA and Panchayat Raj Engineering Department (PRED). In a few instances, even Urban Water Boards/Local Bodies are providing water in urban fringes, which happens to be the rural areas.

4.5.3.1 Panchayat Raj Institutions

The impetus of RWSS under sector reforms, WB projects, Swajaldhara etc. has been the community participation in planning, implementation, operation and maintenance etc. Therefore, PRIs, by design, are expected to play a key role in these programs and the success of the programs mainly depends on their participation and role sharing in the program. However, in determining their effectiveness in performing the anticipated roles, the critical factor is the capacity of PRIs and measures undertaken for building it for the expected roles. It is in this context, that a review of structure, functions and staff of PRIs, needs to be discussed.

Structure

In line with 73rd Constitutional Amendment Act, 1992 the Government of Karnataka enacted Panchayat Raj Act, 1993. Upon being in effect from 1993, the major aim of the act was to achieve democratic decentralization in the governance of rural areas. The RDPR Department coordinates the process of the establishment of the PRIs under the above legislation and monitors their functioning. Under the act, the responsibility of plan formulation and implementation are being taken to the people by transferring the functions, functionaries and finances to these decentralized institutions.

The *Panchayat Raj* Act, 1993 is a single comprehensive act covering all the three tiers of *Panchayat Raj* in the state. Amongst the improvements from previous acts and provisions, following are worth mentioning:

- The nomenclature of the three tiers of PRIs is now: *Zilla Panchayat*, *Taluka Panchayat* and *Gram Panchayat*. The new designations of the official heads are now Chief Executive Officer and Executive Officer for ZP and TP respectively. Similarly, at GP level the President (*Adhyaksha*) and Vice President (*Upadhyaksha*) have been designated (elected functionaries).
- The provision of co opting persons from SC/ST/Women into ZP, TP has been widened.
- Elections to Gram *Panchayats* are to be conducted on a non-party basis, whereas elections to other two tiers (ZP, TP) are to be conducted on party lines.
- The number of standing committees at ZP level has been increased.
- The number of functional committees at GP level has been increased.

The Rural Development and *Panchayat Raj* Department (a separate department) deals with establishment and development of these institutions. A senior IAS officer in the cadre of Secretary (Panchayat Raj) supervises and guides the activities of PR development. There is a *Panchayat Raj* Engineering Department (PRED) within RDPR (which prior to June 18, 2005 was called as Rural Development Engineering Division) to implement rural infrastructure projects. The PRED is headed by a chief Engineer and looks after the technical and implementation aspects of rural infrastructure including RWSS schemes implemented by the state government.

Functions and Roles of PRIs

There are 5659 GPs, 174 TPs and 27 ZPs in the state. With the Panchayat Raj Act, 1993 of GoK, the Government has transferred about 21 responsibilities to the PRIs, which were initially carried out by respective line departments of the government. Thus at present, a total of 151 functional responsibilities pertaining to 29 "subjects" (amongst the list of subjects under the control of States, as per Constitution of India) have been assigned to the PRIs. The GPs have been directed to form 6 committees from its members for the purpose of discharging various functions devolved on to them.

Functions Actually Performed

Although a large number of functions have been devolved onto the GPs as per existing acts, the field survey as well as and structured survey reveals some contrasts. It indicates that GPs mostly perform civic functions like drinking water supply, street lighting, sanitation and drainage, and maintenance of internal roads. The primary function of TP is more on management of elementary education, whereas that of ZP is management of secondary education besides being associated with minor irrigation (RDPR activities), rural water supply and sanitation, inter *taluka* roads and to manage centrally sponsored SGRY/PMGSY etc.

Effectiveness of the Roles

To assess the effectiveness of PRIs, we need to differentiate between decentralization and devolution. The term devolution refers to transfer of authority including planning and implementation of schemes pertaining to the devolved functions. The difference need to be made between involvement of chiefs of Institutions and empowerment of institutions. While, it may be logical to grant some powers (authority) to the *Adhyaksha*/Chief of these institutions, the real decision making power should rest with the institutions. In the context of empowerment of PRIs, a lot still needs to be done by GoK.

A very important observation is on the role of SHGs, WUAs etc. which have been created with a positive aim of raising stakeholder participation in the development process. However, are their roles undermining the efficacy of the democratically elected PRIs. A charge is levied that these groups tend to ignore the imperatives of institution building by assuming functions that belong to functional domain of PRIs. For ex. the constitution of VWSC, which is to be registered as a separate society under the Societies Act is not a part of GP/PRIs and thus can be said to carry out/encroach over the legitimate functions of the GP to provide rural water supply. In this way, each of the functions of GP could then be transferred to such independent societies. The positive logic provided against this is that Chairman, GP is the Chairman of VWSC (in the village from where he/she has been elected) and thus GP could exercise its powers. Once again, the issue is not the "person' but the "institutional building and empowerment". Overall, the aspect of parallel functioning within the functional domain of PRIs is a very critical issue, which would merit considerations in the pursuit of achieving the goal of empowerment of PRIs in the state.

Staffing:

ZP level

The political head of a ZP is the Chairperson, who is indirectly elected by the directly elected members (one from each Taluka) of the ZP. Each ZP has a Chief Executive Officer (CEO), who is a state official either from IAS/ KAS cadre (in exception case, it could be from Rural Development and Panchayat Raj Department).

This is managed by an Executive Officer from the ZP. The EO is an official of the Rural Development and *Panchayat Raj* Department.

Gram Panchayat Level

The total number of members in a Gram Panchayat varies from 10 to 20 consisting of President (adhyaksha), Vice President (Upadhyaksha) and the directly elected ward members. In addition, there is one government appointed GP secretary and bill collector. Most of GPs visited were having both GP Secretary and bill collector in place (mainly concerned to water supply). Besides this some GPs also employ a *safai karmachari,* and a guard/peon.

The GPs are required to have a number of functional committees, but most of them are either non-existent or have been created for a paper-formality. The VWSC was observed to be the most vibrant committee.

4.5.4 Sources of Funding for GPs

To effectively discharge their functions, it is important that GPs achieve financial self sustainability. For his, statute under section 199 of PR act, 1993 have been provided to GP to levy and collect various taxes (land and buildings, entertainment, vehicles, advertisements, hoardings etc.), cess etc. within GoK specified limits, to meet both sustenance and development initiatives. The major non-tax revenue of GPs was the fee charged for water supply, which in most instances is now managed by VWSSC. The major sources of funding for GPs are (list is illustrative and all GPs might not receive funds under it):

From State

These are paid to GP as per recommendations of SFC (State Finance Corporation). This includes sharing of proceeds from state taxes (as per recommendations of SFC), incentives, share in registration fees etc. besides the grants to be paid to GPs from the consolidated Fund of the state. At present, this grant is @ Rs 5.00 lakh per GP per year.

From RDPR

 Annual Maintenance Grants received for maintenance of water supply schemes (hand pumps, mini water supply scheme, piped water supply scheme etc.)

From **ZP**

• Funds under SGRY scheme

From Own sources

- House tax
- Street lighting tax
- Construction fee
- Market fee
- Cattle fund fee
- Documentation charges
- Taxes (entertainment, vehicles, advertisements and hoardings)

The ZPs and TPs don't have any powers to directly levy taxes. Amongst the locally raised revenue of GP, the maximum contribution is from the house tax.

4.5.5 Fund Flow Mechanism under Sector Reforms, Swajaldhara, Jal Nirmal, TSC etc.

Under this, the GOI releases the central share of funds directly into the bank accounts of ZP/DWSCs. They usually maintain separate accounts for various projects. The release of Central funds is made in installments as per the program guidelines. The matching state share, against the release of central funds, is also released to DWSCs/ZPs. The funds are then directly transferred to respective VWSCs, Overall, political entities like MLAs and MPs do not have any direct role in channeling funds or in implementation of the schemes.

4.5.6 Issues in Institutional Mechanism- Summary

The KRWSSA needed a better role definition between project management, project facilitation and monitoring. It must be accordingly strengthened to perform these roles. It is needless to emphasize that the positioning and the leadership is crucial to the success of the entire reform initiatives. Such path breaking programs must be driven in a mission mode (as mandated through KRWSSA) by the persons managing it and they must believe in the philosophy and should implement it with great zeal.

The DSUs (created under *Jal Nirmal*) needed a complete re-look on their mandate, position, staff, linkages and funding. VWSSCs need to be more community responsive, which shall be possible with effective IEC and associated capacity building initiatives. This may require use of external agencies (support organizations, NGOs etc.) on contract, at required levels to carry out the needed tasks.

PRED (new name of RDED) need to be equipped for a more meaningful role in the system. More specifically, it needs to build its engineering capabilities to meet the emerging issues of integration of social considerations in planning, implementation and more importantly O&M by the community.

With increasing decentralization and devolution of responsibilities to the lowest level (GPs), PRIs need a lot of strengthening (including strengthening the human resource numbers, funding etc) as well as capacity building to enable the to perform the desired tasks with efficiency and effectiveness.

Issues for Reconsideration/Recommendations

- The modalities of planning and implementation by Central, State and *Panchayat Raj* institutions should be comprehensively reordered to sub-serve the dynamics of decentralization.
- At the state level, there is an urgent need to develop a comprehensive mechanism for integrated water resource management.
- Various organizations engaged in the water sector should not work in isolation and complement one another without duplicating efforts:
 - Watershed development could focus on source sustainability
 - JYSY could support recharging of ground water for drinking purposes by carrying out de-silting of village level ponds

• Database of groundwater movement be shared amongst various organizations like irrigation, Mines and Geology, RDPR, KRWSSA etc. levels

This could be achieved by having various inter-departmental members on the policy making bodies (steering committees) of these organizations.

4.6 Legal Provisions (Acts)

4.6.1 Legal provisions and their implementation status – PRIs/VWS&SCs

GoK has of late realized that the *Gram Panchayats* are the focal points for the implementation of the rural drinking water supply and environmental sanitation projects; and on this premise, devolved the primary responsibility for planning, procurement, construction, operation, maintenance and management of rural water supply and sanitation facilities on the GPs as provided under the Karnataka Panchayat Raj (Third Amendment) Act, 1997 which came in to force on 20.10.1997. Section 61-A inserted under Section 61 empowers GPs to appoint one or more committees consisting of such members as it may decide for any purpose other than those specified in Section 61 and; may invest the committee so appointed with such powers and functions as may be necessary or expedient for the fulfillment of the purpose for which it is appointed. In order to ensure compliance to this mandate through the participation of the communities, GoK has issued guidelines to all the GPs for strict compliance vide Circular No RDP RWS 144 2002 dated 03.5.2005. Its salient features are -

- Each GP should pass a resolution to constitute a Village Water Supply and Sanitation Committee (VWS&SC) under Section 61-A of the KPR Act 1993 (as amended).
- Gram *Sabha* should be held in each village, the objective of constituting a VWS&SC should be explained in detail and a VWS&SC should be constituted as per the Model Bye Law.
- GP should accord recognition to such Committee through a GP resolution as one of its Sub Committees.
- The VWS&SC should undertake the entire responsibility of O&M of the present drinking water supply schemes and all the new schemes implemented under various programs; and prepare an integrated village-wise annual budget.
- A separate O&M Joint Account should be opened in the local bank in the name of the VWS&SC with the Chairman, Secretary and Treasurer as Joint Signatories.
- Water tariff collected from the Users should be credited to this account i.e. O&M account; and for any reason the water tariff collected from the Users should not be credited to GP Category-I Account.
- Documents pertaining to O&M viz., Proceedings Book, Annual O&M Budget, Users list, Tax Collection Register, Receipt Book, Bank Pass Book, Log Book etc., should be caused to be handed over to the custody of the Treasurer from the GP Secretary; and the VWS&SC should itself maintain necessary documents.
- Salaries of the Water Man and Tax Collector along with repair and electricity bills should be met out of the water tariff collected from the Users.

- VWS&SC Chairman, Secretary and Treasurer should jointly sign to withdraw money from the O&M Account towards salaries, electricity bills, repairs or spare parts purchase; and the amount withdrawn should be used for such expenses only.
- GP Secretary should verify the accounts of the VWS& SC accounts at least twice in a month and issue necessary guidelines to the Committee.
- Transparency should be ensured by placing the income and expenditure details of the drinking water supply schemes before the community once in 6 months in the Ward/*Gram Sabhas*.
- GP should allocate O&M grants (annual maintenance grant), if released from the Government, to the VWS&SC as per the type/design of each scheme; and credit the same to the O&M Account of the VWS& SC.
- GP-wise and Village-wise water tariff collection should be reviewed under the Chairmanship of the Executive Officer of the *Taluk Panchayat* and reported to *Zilla Panchayat* every month.
- All the books of accounts should be produced for audit by the Local Audit Circle, State Accounts Department every year.

Status of composition and functioning of VWS&SCs

In order to adopt demand responsive strategy and also to institutionalize community participation for the sustainability of drinking water systems and sources in rural areas, the Gol, while launching a reform initiative under **SWAJALDHARA** on 25.12.2002, has suggested an institutional set up within the traditional institution of GP known as Village Water and Sanitation Committee which is almost similar to the one already constituted by the GoK in respect of **Jal Nirmal** Project vide Government Circular No RDP 84 PPM 2001 dated 05.4.2002.

Though the objective of the VWS&SCs constituted under Government Circular Nos RDP 84 PPM 2001 dated 05.4.2002 and RDP RWS 144 2002 dated 03.5.2005 and also the institutional models are one and the same (ie., adoption of a demand responsive, adaptable approach along with community participation based on users' empowerment), each one is distinct from the other in the following aspects:

SI. No.	Institutional Model 1 Govt Circular dated 05.4.2002	Institutional Model 2 Govt Circular dated 03.5.2005			
	JAL NIRWAL Project Schemes	All Drinking water Supply Schemes			
1	The Secretary of the GP shall be the	Item No 7 and 12 contemplate a			
	Ex officio Secretary of the	separate person to act as Secretary to			
	VWS&SC. Mandatory as per	VWS&SC chosen in Gram Sabha from			
	Model Bye Law.	among the Users.			
2	The President of the Gram Panchayat	Item No 7 and 12 contemplate a			
	shall be the Chairman of VWS&SC.	separate person to act as Chairman to			
		VWS&SC chosen in Gram Sabha from			
		among the Users.			
3	VWS&SC shall be the Committee of Gram	Gram Sabha constitutes VWS&SC and Gram			
	Panchayat constituted by the Gram	Panchayat ratifies it through a Gram			
	Panchayat through a resolution in each	Panchayat resolution.			
	village.				

4	A Chairman may be elected from among the resident Gram Panchayat Members to the VWS&SC if the GP President is not resident.	No such contingency is contemplated since the Chairman of the VWS&SC is chosen from amongst the Users of the village in the Gram Sabha.
5	Vice Chairman and Treasurer shall be selected/elected to the VWS&SC from among the VWS&SC Members by the Members.	While no office bearer as Vice Chairman is selected/elected, the Treasurer along with the Chairman and Secretary of the VWS&SC are selected/elected by the Gram Sabha.
6	Payment of the wages, bills for any work connected with construction, operation and maintenance of water supply and sanitation schemes in the villages shall be made by the GP Secretary only on obtaining an attendance certificate and a satisfactory performance certificate from the Chairman of the VWS&SC.	Item No 12 confers the power of withdrawing money jointly from the O&M account towards wages, electricity bill, repair or purchase of spare parts on the Chairman, Secretary and Treasurer of the VWS≻ and devolves a responsibility on them to utilize the withdrawn money only for such related expenses.
7	The Secretary of the Gram <i>Panchayat</i> will act as an Accountant to the VWS&SC also; and will maintain necessary accounts as per the Budget and Account Rules of Gram <i>Panchayat.</i>	Item No 9 contemplates transfer of all records pertaining to O&M Account viz., proceedings book, annual budget and maintenance account, users list, tax collection register, receipt book, bank pass book, pump log book from the Gram <i>Panchayat</i> Secretary to the custody of the VWS&SC Treasurer to be maintained by the VWS&SC itself. Further, Item No 13 authorizes the Gram <i>Panchayat</i> Secretary to inspect accounts of VWS&SC and to issue necessary guidelines at least twice in month.
8	Model Bye laws restrict the scope of the VWS&SC to only the State/Central Government as well as the Externally Aided Projects of rural water supply and sanitation and other developmental activities.	Item No 5 devolves the entire responsibility of O&M on VWS& SC in respect of the present drinking water supply schemes and the new schemes implemented under various programs as well in the village.
9	Model Bye Laws serve the limited purpose.	Model Bye Laws are mis-quoted under Item No 2 since Item Nos 2 (composition, selection of office bearers), 5 ,6 (scope), 7, 12 (joint bank account and operation by VWS&SC Chairman, Secretary, Treasurer to meet related expenses including wages), 9 (custody of books of accounts under VWS&SC Treasurer), 10 (maintenance of records) confer much more functional autonomy with regard to the choice of the scheme, construction, procurement, O&M aspects on VWSSCs encompassing the universe of the drinking water supply and sanitation schemes implemented/being implemented in a village.
10	The term of the VWSSCs shall be co terminus with the term of the Gram <i>Panchayat</i> and continues to function as a Sub Committee of the Gram <i>Panchayat</i> or the Administrative Committee in the event of the GP being super ceded	No such mandate can be made specific since all the office bearers of the VWSSCs are selected/elected through a majority vote/opinion of the Gram Sabha (stakeholders' assembly) in the village.

Perceptions of the stakeholders on the institutional models.

A large umber of VWSSCs have been constituted as per the Government of Karnataka Circulars dated 05.4.2002 and 03.5.2005 ibid under Section 61-A of the Karnataka *Panchayat Raj* Act 1993 (as amended). These committees indicated inclination and acceptability towards the latest Government Circular dated 03.5.2005 rather than the one dated 05.4.2002. This was possibly for the obvious reason that the VWS&SC created under the former one is user-based besides being apolitical and enjoys due functional freedom. In most schemes, although the Gram *Panchayat* elections were conducted as early as February 2005, the newly elected *Panchayat* Members are yet to be inducted into the VWSSCs constituted under the Government Circular dated 05.4.2002; and these Committees are yet to be reconstituted. The interim Administrative Committees of the superceded GPs were not active in managing the affairs of the VWSSCs; and the erstwhile office bearers (by virtue of not being any of the GP functionaries) of these Committees continued to transact the day-to-day business; and thus ensured sustained institutional governance. Stakeholders (users) had certain reservations with regard to the election processes of GP members, their tenure of office, their commitment to the schemes etc.

Status of Empowerment, Decentralization – VWS&SCs

The Government Circular dated 05.4.2002 is in consonance with Section 58 Sub Section (1) of the KPR Act 1993 (as amended). Accordingly, GPs perform the functions specified in Schedule I as per the guidelines or norms laid down by the funding agencies i.e. Gol/GoK/World Bank etc. As far as the construction of drinking water supply and sanitation infrastructure is concerned, the Government Circular dated 03.5.2005, irrespective of the guidelines of the funding agencies, is in conformity with Section 58 Sub Section (I-A), of the KPR Act 1993 (as amended), in accordance to which it shall be obligatory on the part of a GP to make reasonable provision in so far as the GP fund at its disposal will allow in regard to maintaining all the water supply works *inter alia* either on its own or by annual contract by generating adequate resources. Moreover, it is within the competency of the GP to select members for the VWSSC as it may decide - not necessarily from the elected GP members as could be interpreted from Sub Section (1) of Section 61-A of the KPR Act 1993 (as amended). The VWSSCs, thus, derive statutory powers to adequately function as an extended arm of the GP.

4.6.2. Role and responsibilities of elected representatives.

The Chairman or Vice Chairman or the members of the GP along with the jurisdictional MPs/MLAs play vital role in the need based budget allocations and sanction of funds to the GPs under various developmental programs of the Government including construction of infrastructure of water supply augmentation schemes to provide designed service levels, quality and overcome source problems. They are responsible to mobilize funds towards capital cost sharing of such schemes by raising community contributions in cash, kind or labor. All of them unitedly strive to cater to the quality drinking water needs of the villagers and the livestock as well. Settlement of disputes of any kind attracts due and timely attention of the elected representatives. The responsibility shouldered by them ensures that the VWSSC, as an extended arm of the GP, discharges its duties and functions in a sustained manner in the capacity of a cutting edge community based vibrant democratic institution. All the jurisdictional elected representatives of the GP act as facilitators for the efficient delivery of services by the VWSSCs.

In order to tackle the drinking water supply problem during summers, GoK issues respective orders formulating committees, which are functional for the year. During the year 2005, the

GoK has constituted a Task Force in addition to the *Taluk* Scarcity Relief Committee for each *Taluk* vide GO No RDP 87 RWS (2) 04 dated 01.4.2005 to be functional till 30.6.2005. The committee is under the Chairmanship of the MLA representing that *Taluk* with the other Legislators and the *Taluk Panchayat* President, *Tahsildar*, Geologist, ZP AEE, KPTCL Engineer as members. *Taluk Panchayat* EO is its Member Secretary. This Committee is empowered to accord approval to the emergency relief action plans of the *Taluk* concerning drinking water problem utilizing the State/Central funds under MNP and ARWSP in close coordination with the action plans approved by the *Taluk* Scarcity Relief Committee.

4.6.3. GW and DW Protection Acts – Awareness, Implementation, Limitations etc.

GoK has enacted the Karnataka Ground Water (Regulation for Protection of Sources of Drinking Water) Act 1999 and Rules 2004 which came into force on 21.7.2004. The major salient features of the act are as follows:

- Deputy Commissioner is the Appropriate Authority to declare water scarcity area under Section 4.
- Appropriate Authority
 - Regulates the extraction of water by restricting or prohibiting such extraction from any well situated within a distance of 500 meters of the public source of drinking water under Section 5(1).
 - Declares over exploited watersheds under Section 6.
 - Prohibits sinking wells within the area of an over exploited watershed under Section 7(1).
 - Prohibits the extraction of water from the existing well in area of over exploited watershed affecting any public source of drinking water during the 5 months period from 1st February to 31st July every year under Section 8.
 - Orders the owner of any existing well in the area of an over exploited watershed affecting any public source of drinking water to stop the extraction of water from, and close, seal off such well either temporarily or permanently under Section 9.

However, this legislation lacks adequate publicity. During filed visits, it was observed that only a limited number of ZP/GP officials and very low number of villagers are aware of the act and that too of only some of the provisions of this Act. Further, the officials did not show any keenness to regulate and the villages any eagerness to abide by the same, since the punishment contemplated against the offenders is not substantial. Summary powers are vested in the Appropriate Authority who initiates suo motto inquiries in connection with the protection of a public source of drinking water; and exercises limited powers against the offenders viz., (1) Removal of obstruction (2) Closure of pumping of the water (3) Power supply disconnection (4) Seizure of any material or equipment (5) order the offender to close or seal off the well at his expense. In case of failure on the part of the offender to comply with any of such orders, he/she may enter upon the land and close or seal off the well and the cost incurred there of shall be recoverable from the offender as an arrears of land revenue. Whoever contravenes any of the provisions of the Act, be punished only on conviction, with imprisonment for one month to six months or fine of Rs.1000 to Rs.5000. or with both; and who ever damages/alters public water supply system, on conviction, be punished with imprisonment for two months to one year or fine of Rs.2000 to Rs.5000 or with both. If the offence continues even after conviction, the offender shall be punished with the additional fine extending to Rs.100 for every day.

The State reeled under severe drought for nearly 4 years from 2001 to 2005. Sources of drinking water schemes dwindled resulting in acute scarcity of water. Therefore, the Deputy Commissioners being Appropriate Authority under the Act ibid arranged to cater to the needs

of the people and the livestock by taking recourse to purchasing water from the owners of the potential bore wells at the expense of the scarcity relief grant and transporting to the communities instead of restricting or prohibiting extraction of water from any well affecting public source of drinking water as provided under Sections 5(1), 7(1), 8 and 9 in the best interest of maintaining harmonious relations among the villagers. Observations reveal that the stipulation of restricting or prohibiting extraction of water from any well situated within a distance of 500 meters of the public source of drinking water introduced under Section 5(1) is honored more in breach than in practice. Bore wells continue to be drilled both by the Government and the Private Agencies indiscriminately in disregard of the over exploited watersheds or dry/grey areas. During field visits, exercising any of the powers conferred under this Act by the Appropriate Authority appears to be non-existent, as the very objective of regulating the exploitation of ground water has not been realized in any known case.

4.6.4. Pollution Control (Water Contamination)

Under Section 17 of the Water (Prevention and Control of Pollution) Act, 1974, State Pollution Control Boards are created to plan a comprehensive program for the prevention and control or abatement of pollution of streams and wells in the State; and to secure the execution. World Health Organization has estimated that 80% sickness is associated with contaminated water either from chemical or microbial contamination.

4.6.5 Sanitation

The sanitation program is also legally supported by legislations like the Karnataka *Panchayat Raj* Act of 1993, Section 58, schedule I Entry XVIII which states that `maintenance of general sanitation, cleaning of public roads, drains, tanks, wells and other public places, construction and maintenance of public latrines is one of the functions of the *Grama Panchayats*. The *Zilla Panchayat* and the *Taluk Panchayat* Acts also mention under Schedule II Entry IX and Schedule III Entry X as `Implementation of Rural Sanitation Schemes' and `Promotion of drinking water and sanitation programs'.

To further ensure support from the legislatures the Karnataka *Panchayat Raj* Act was amended to make it mandatory for the elected representatives to ensure participation in the program. To begin with owning a latrine in their house became a mandatory requirement to contest the *Panchayat* elections and those who did not adopt the norm could be disqualified from the membership. The role of the *Gram Panchayat* and the *Taluk Panchayat* in sanitation promotion became more defined as a result of this action and has also resulted in creating a wide spread awareness across the *Gram Panchayat* to work towards a sanitized village. To contest the elections, it is estimated that about 45,000 (elected) members have installed individual sanitation facilities as a result of this act.

Under *Panchayat Raj* Act, 1993 (Section 58) *Gram Panchayats* is to earmark places away from dwelling units (residential houses) for dumping refuse and manure.

Similarly, under section 145 of Karnataka *Panchayat Raj* Act, 1993, *Taluk Panchayats* can acquire land for locating manure pits away from dwelling units (residential houses) in the villages.

4.7 Investment Pattern in RWSS Sector

4.7.1 Overall Scenario

Huge investments have been made in the RWS sector in India. One estimate puts the amount at Rs 34,000 crores¹³. Yet, the results have not been commensurate, with the nation still continuing with drinking water scarcity in several areas. In Karnataka, since 90-91, about Rs 4000 crores have been invested in RWS sector. Considering the present rural population, it works out to more than Rs 1000 per capita. During recent years, investments in RWS sector have enhanced significantly, being more than Rs 550 crores per year.

These investments have shown improvements in the state's coverage. For quite sometime, Karnataka has been able to cover all its rural habitations with supply of drinking water. However, the habitations, which once became fully covered, have fallen back to partially covered. Ground water, the main source of RWS, is depleting with significant fall in watertable. Similarly, water-quality is becoming a major concern. On sanitation, while progress in coverage has been made, however the pace of progress is quite slow.

In the following sections, investments made under major schemes have been analyzed to understand different approaches undertaken in the RWS sector in Karnataka and their financial effectiveness. Sources of these investments as well as the factors that affect their future availability have also been examined.

4.7.2 Investments in Rural Water & Sanitation Sector

Rural Water and Sanitation sector investments have been growing consistently from year to year. Detailed year-wise expenditure over last 16 years and the major sources of funding are presented in Table 4.7.1. It can be observed that during 1990-91, the annual allocation was only Rs 41.61 crores. Since then, there is more than 10-fold increase in allocations and the current year's (FY 2005-06) allocation for the RWS sector is Rs 554.76 crores. However, during last two years, there is a significant increase and the annual allocations are almost Rs 550 crores. This is mainly due to increase impetus on the activities of *Jal Nirmal* project.

As presented in Fig 4.7.1, the annual investment growth in the sector on year to year basis, shows major fluctuations. During some years, the increase in annual expenditure was as high as 45.8% (93-94), while in few other years, there has been a decline, largest being a (negative) allocation of -9.2% in 2002-03. Annual changes in investments are indicated by blue graph line in the chart above. However, to have a better understanding of this growth, trend of increase in RWS expenditure has also been calculated by considering 1990-91 as the base year and discounting the increase in investment for number of years. The pink line in the figure depicts the "real" trend.



Increase in RWS Expenditure

As can be seen, this provides a more consistent growth pattern. In the initial years, RWS expenditure increased rapidly to almost 25-30% and continued at this rate till about 1999-2000. Since then the rate has come down consistently and reached 17-18%. However due to sharp increase in *Jal Nirmal* expenditure in last two years, it has again risen to about 22%. Details of these year-wise changes have been given in Annexure 4.7.1.

Year	Total State Dev. Exp (incl. Central funds)	RWSS Sector				
		Expenditure/ Allocation	% of Total State Exp.	% share		
				State	Central	EAP
990-91	1566	41.63	2.66%	47.8%	52.2%	0
991-92	2053	45.82	2.23%	55.8%	44.2%	0
992-93	2424	62.30	2.57%	58.5%	41.2%	0.4%
993-94	3254	90.87	2.79%	56.4%	42.0%	1.6%
994-95	3469	101.50	2.93%	59.4%	39.7%	1.0%
995-96	3788	157.44	4.16%	49.5%	36.8%	13.7%
996-97	4464	194.15	4.35%	44.0%	36.3%	19.8%
997-98	4929	238.67	4.84%	41.7%	44.1%	14.3%
998-99	6222	311.70	5.01%	30.0%	28.8%	41.2%
999-00	6430	317.24	4.93%	25.1%	35.3%	39.6%
2000-01	8032	339.45	4.23%	38.3%	34.4%	27.3%
2001-02	9167	308.24	3.36%	41.9%	45.4%	12.6%
2002-03	9325	279.64	3.00%	40.1%	54.2%	5.7%
2003-04	10671	363.86	3.41%	26.9%	60.2%	12.9%
2004-05	(RE) 12,764	(RE) 540.15	4.23%	30.1%	26.5%	43.3%
2005-06	(BE) 14,949	(BE) 554.76	3.71%	22.1%	21.0%	56.8%

 Table 4.7.1 Year wise Allocation in Rural Water Sector in Karnataka

 Crores

Rs in

Source: RDPR documents

4.7.3 Sources of Funding

There are three main sources of funding i.e. state, centre and externally aided projects (EAPs) for the RWS sector. The EAPs have played an important role in RWS sector, and particularly so in Karnataka. Most international and bilateral funding agencies involved in the sector have implemented a number of projects in Karnataka. The state government, while preparing its annual plans takes cognizance of outlays under EAPs. Hence the outlay of the state government includes EAP outlays. These constitute important part of the total annual outlay for the sector. For example, the 10th Plan envisaged more than 50% contribution in the RWS sector coming from EAP projects¹⁴.

¹⁴ Karnataka Annual Plan Vol 2 2005-06, Planning & Statistics Dept.

The state's expenditure in RWSS sector, as shown in Fig. 4.7.2 has averaged around 3.5% over last 15 years, ranging between high of around 5% to a low of around 2.5%. For yearwise state and central development expenditure in comparison to the RWS investments refer to Annexure 4.7.2

In the 10th Plan (2002-07) the state had planned an investment of around 3.4% in the sector. The overall allocation for the sector has been rising in absolute terms. For, example the expenditure/allocation over last four years is Rs 280 crores (2002-03), Rs 364 cr (2003-04), Rs 540 cr (2004-05) and Rs 554 cr (2005-06).



al Plan of the State

During first 5 years of 90s, annual sector allocation was around 2.5%, but rose sharply to reach 5% in the year 98-99. Interestingly during the same period i.e. from 1995-96 share of EAP projects in RWSS sector also rose from being almost minimal to more than 40% in 1998-99. In more recent times sector allocation is around 3.5-4%. Interestingly during the year 2002-03, when EAP share dropped to 5.7% the sector expenditure of the overall development plan also was only 3%. This indicates a strong relationship between the EAP funding and the increase in sector funding, indicating limitations in terms of resources at the state and central levels.

From Table 4.7.1, it can be observed that the state and centre have generally been sharing funds almost equally. During initial years, the state was providing about 10-20% more funds than central allocations. However, from 2001-02 onwards, the trend has been reversed and the central funding is higher than state funds. In fact state's share of funds in year 2003-04 was only Rs 97 crores as compared to Gol share of Rs 219 crores. EAP projects' share of expenditure has generally been marginal, except for the period 97-98 to about 2000-01. Similarly, during last two years (2004, 2005), due to increase in activities of The World Bank funded *Jal Nirmal* project, allocations under EAPs are more than 50% of total fund allocation.



Fig 4.7.3 Share of Different Sources in Annual Funding for RWS Sector

clearly indicating the trend of increase in central expenditure and decline in state's expenditure. Although in last two years the trend has again reversed and the centre and state funding has nearly been equal. Funding under EAP projects is rather sporadic; indicating the general nature of project based funding. It can be observed that Till 94-95 EAP projects had minimal funding. However, when *Danida* project picked up and the share of annual funding reached around 40% during 98-00. Since then, it declined. EAP's share of funding has again risen sharply mainly due to increase in momentum of activities under The World Bank funded *Jal Nirmal* project. It is likely to go further up during the current financial year.

4.7.4 Budgetary Analysis

The above analysis provides details of expenditure pattern for last 15-16 years. To understand the present scenario, last two years' budget allocations, as presented in Table 4.6.2, have been further analysed. Currently the major funds are being provided under the World Bank schemes and Accelerated Rural Water Supply Programme (ARWSP), which are supported by the state government funded National Rural Water Supply Programme (NRWSP), under the overall Minimum Needs Programme (MNP).

				Rs in Crores	
Scheme	2005-06 (BE)	%	2004-05 (RE)	%	
1. STATE BUDGET ALLOCATIONS					
Jal Nirmal (World Bank)	306.50	55.2%	220.00	40.7%	
Water Schemes and maintenance (NRWSP/ARWSP)	48.73	8.8%	39.11	7.2%	
Repayment – KLAC	28.23	5.1%	77.88	14.4%	
Suvarna Grama (New Scheme)	20.00	3.6%	-		
PM Gramodayba Yojana	12.10	2.2%	18.91	3.5%	
IRWS & ESP (Danida)	9.55	1.7%	14.60	2.7%	
Nirmal Grama Yojana	8.94	1.6%	9.25	1.7%	
Sub-Mission	2.86	0.5%	3.00	0.5%	
MIS, monitoring, etc.	1.12	0.2%	0.96	0.2%	
Panchsutra			13.08	2.5%	
Sub-total (1)	438.03*	78.9%	396.79*	73.4%	
2. CENTRALLY SPONSORED SCHEMES (as per Annexe VI of GoK's Annual Plan)					
Sub-Mission Projects	9.79		9.60		
MIS, Monitoring, etc.	1.05		1.65		
Water Schemes and Maintenance (NRWSP/ARWSP)	105.89		132.11		
Sub-total (2)	116.73		143.36		
Grand Total (sum of 1 and 2)	554.76	100%	540.15	100%	

Table: 4.7.2 RWS Sector Budget Analysis for Last Two Years

* Including EAP Projects

_ . _

BE = Budget Estimates

Budget analysis of Financial Year 2005-06 indicates that about 70% of the state funds are allocated for the World Bank project covering 11 districts, which is 55% of total allocations i.e. after including GoI funds. The second major thrust area under state allocation is ARWSP/NRWSP schemes. The state during FY 2005-06 has increased its overall allocation to these schemes by about 20% over the previous year's allocation. Most other schemes are of much smaller scale. Even the allocations under Danida project has declined during the current year. The scheme-wise details of different projects being implemented in Karnataka are given in Table 4.7.3.

In addition to the state allocations, GOI allocates funds to water sector through various Central Sector and Centrally Sponsored Schemes. One mode is to directly provide funds through schemes like, Sector Reform Program and *Swajaldhara*, etc. The other is through the state budget, mainly ARWSP, sub-missions, etc.

4.7.4 Investments under Various RWS Sector Projects

4.7.4.1 Jal Nirmal

The Jal Nirmal Project (Rs 1000 crore project), funded by the World Bank, is being implemented in 11 contiguous districts, from Bidar to Uttar Kannada, of north Karnataka. The project is based on demand driven approach and is being implemented with active participation of community (Village Water Supply & Sanitation Committee). Since its inception in FY 2001-02 to the financial year 2004-05, project has spent around Rs 198 crores. Out of this Rs 143.7 crores were incurred during 2004-05, indicating a late surge in the project activities. Although in past the project has not been able to utilise its full allocations, however with project having incurred Rs 105 crores in 5 months till Aug'05, it is expected that in current financial year, the project would be able to use all or substantial part of this years allocations.

The major water supply schemes being implemented by the project are Piped Water Supply Schemes (PWS), *Jhari*, Integrated Tanda Development Program (ITDP) and Multi-Village Scheme. PWS are being implemented under different phases, such as Pilot, Batch I, Batch II and Batch III. The Pilot Batch was initiated in 3 districts (Belgaum, Dharwad and Gulbarga). The purpose was to gain an understanding under the new approach. While most of the pilot schemes have been completed, for Batch I around 46% of the schemes have been completed and around 40% in Batch II. World Bank project covers a number of components apart from the Water Supply schemes, including Roads and Drainage, Household Latrine, Smokeless *Chullah*, Groundwater Recharge, GP strengthening, etc.

4.7.4.2 Accelerated Rural Water Supply Project

This is a centrally sponsored scheme under National Rural Water Program (NRWSP) with contributions from the state government. The program has following 3 main components.

Borewells with Hand Pumps Scheme

Main thrust of implementing the rural drinking water program is through installation of bore wells with hand pumps. As at the end of the March'05 the state had a total of 191,147 of such installations. Normally all habitations, with a population of less than 500, are provided with this scheme. During last 6 years a total of 22,168 schemes have been installed at an investment of Rs 110.6 crores. Considering an average number of persons served by such a

scheme as 250, the per capita cost (based on average of last 6 years investment costs) works out to Rs 200. However, as per the current costs, it is now around Rs 277.

Mini Water Supply Scheme

Normally a Mini Water Supply Scheme (MWS) is constructed, where the population is between 500-1000. Till Mar'05, 22549 MWS schemes have been implemented in the state. Of these, 8068 schemes have been implemented in last 6 years at a total investment of Rs 207.25 crores. Considering that on an average, a MWS provides water to around 150 families or about 750 persons, the per capita cost, calculated based on investments in last 6 years, is Rs 343. On the current level of costs, it is about Rs 373.

Piped Water Supply Scheme

The PWS distribute water from the main source to various locations, generally using a powered pump, storage tank and distribution pipes. The scheme generally has both household connections as well as public stand posts. Till March 2005, 17383 Piped Water Supply Scheme (PWS), have been commissioned in the state. In last 6 years, i.e. from 1999-2000 to March 2005, a total of 4,796 schemes have been constructed at a cost of Rs 310.2 crores. Although, it is recognized that there are variations in costs from scheme to scheme depending on size and complexity, the average cost of a PWS works out to Rs 6.46 lakhs.

4.7.4.3 Water-Quality Addressal Program

As the water table is declining, water quality is becoming a major concern. Considering this, a number of Sub-Mission projects have been undertaken to address water quality problems (excess brackishness, fluoride, TDS, etc) in rural areas. Under this, 20% of ARWSP funds can be used for such projects with state contributing 25% of the project cost and 75% from the centre. The State has identified approximately 100 projects with an estimated cost of Rs 419.96 crores to cover 1465 villages. From the initiation of the program in 1994-95 to 2004-05, the state has undertaken 46 projects covering 250 habitations with an investment of Rs 116 crores. Till Mar'05 more than Rs 90 crores has been spent. Overall, 27 projects costing Rs 50.29 crores have been completed, whereas remaining projects are at various stages of completion.

In addition to above the state has installed around 100 de-fluoridation plants in 11 identified districts at a cost of Rs 10.2 crores. Another 100 plants based on Adsorption Technology at a cost of Rs 2.3 crores are being installed. Till Mar'05 it has been able to install about 26 such plants. It also plans to provide around 50,000 Household DF (De-Fluoridation) filters at a cost of Rs 8.87 crores. Till March'05 nearly 12,000 such filters have been installed.

4.7.4.4 Sector Reform Program

Despite large investments in the sector, objective of providing minimum potable drinking water to all rural population still lags behind. The Government realized that increased investments are not enough, as projects were becoming unsustainable. Systems fell idle and

even became un-repairable due to poor maintenance. This was mainly due to the social perception that water was a social right and must be provided by the Government, free of cost. It was never realized that it should be a socio-economic resource that should be managed at the lowest appropriate level, with users involved in the planning and implementation of projects. With this objective, GOI accepted the demand driven approach of development of water supply systems, which was encapsulated in Sector Reform Program (SRP).

In Karnataka, under SRP, three districts namely Mysore, Bellary and Dakishna Kannada were selected. Central Govt. allocated 20% of ARWSP and 50% funds of restructured centrally sponsored rural sanitation program towards the SRP. It commenced in June'00 and was to end by Mar'04. Each district was allocated Rs 40 crores for implementing the pilot program. Projects not completed by March 04, have since been transferred to *Swajaldhara*.

The Dakshina Kannada (sample district visited by the study team) received grant of Rs 36.6 crores. The district was able to mobilise community contribution of Rs 4.6 crores. Although both in Dakishna Kannada and Mysore, substantial amount of allocated funds have been utilized, but in Bellary, projects worth Rs 7.02 crores have been transferred to Swajaldhara.

4.7.4.5 Swajaldhara

The program was commenced in 2002-03. *Swajaldhara* was basically formulated on principles of community contribution and community participation, same as under SRP. However, *Swajaldhara* now covers all the remaining 24 districts. In addition, the unfinished projects under Sector Reform Program in Bellary, has been transferred to *Swajaldhara*.

Till 2004-05, 573 *Swajaldhara s*chemes at a total cost of Rs 35.67 crores have been approved. The average cost of a scheme works out to Rs 6.3 lac. Although there is a significant variation in the average cost from district to district, ranging from as low as Rs 1.44 lac in Uttara Kannada to Rs 16.8 lac in Belgaum. This variation in average cost indicates variation in different type of schemes that are being constructed. A total of Rs 17.3 crores have been spent on these schemes in last 3 years (2002-05) which comes to an average of less than Rs 6 crores for a year. In accordance with the guidelines of the program, it has generated 10% community contribution of Rs 3.56 crores.

4.7.4.6 Other Rural Water Supply Related Programs

Prime Minister's Gramodaya Yojana

The PMGY is a centrally sponsored scheme and provides funds for conservation and recharge efforts. The scheme was started in 1999-00 and concentrates mainly on rainwater harvesting and recharge structures, such as check dams, percolation tanks, infiltration well, etc. Besides these, it also provides funds for de-siltation activities. Till, 2003-04 funds were being allocated to all districts except for the SRP districts. However, from FY 2004-05 all 27

districts could use the funds under PMGY. Till 2004-05 a total of Rs 62.49 crores have been utilised at an average of Rs 12.5 crores per year as no funds were used in the first year.

In addition, under one-time PM's announcement during 2002, project has incurred an expenditure of Rs 19.62 crores towards installation of bore wells with hand pumps providing drinking water to rural schools and for revival of traditional water sources.

Desert Development Programme

This centrally sponsored scheme has been in operation since 1997-98. It provides funds for drought prone districts, such as Bagalkot, Bijapur, Davangere, Raichur and Koppal. During 2004-05 funds have also been received for Bellary district. Under the scheme, funds are used to provide PWS, MWS and bore-wells for attaining 70 lpcd for consumption of both human as well as for the cattle. Till Mar'05 about Rs 50 crores has been spent for installing almost 850 WSS and 1350 bore-wells with hand pumps.

Recharge programme

One of the problems in RWS sector has been the constant drying up of existing ground water sources due to depletion of groundwater table. As a corrective action, the GoK has initiated hydro-fracturing program to retrieve/revive existing bore wells. At present the state has 10 such Units. The program commenced during 2002-03 and till 2004-05 have successfully hydro-fractured almost 3000 bore-wells. The success rate has also improved to more than 95%.

Other Externally funded Projects

Currently Danida assisted *Jalnidhi II* being implemented in the state is for Rs 35.20 crores. The project covers around 20 GPs each in Kolar and Chitradurga districts. The program activities cover technical assistance, support to GoK seconded staff, documentation, workshops & training Programs, development of water supply schemes including recharge structures and HHLs.

Major completed projects

Karnataka Integrated Rural Water Supply & Environmental Sanitation Project I funded by World Bank was implemented in the state in 12 districts covering 1104 villages. The program was administratively closed at the end of Mar'03. The project commissioned 1060 schemes at a cost of approximately Rs 538 crores.

Netherlands assisted program was completed by the end of 2002. The project implemented 201 schemes in 5 districts at a total expenditure of more than Rs 88 crores.

Danida assisted Jalnidhi I was implemented in 4 districts. Under this, 726 schemes of different types were implemented at a cost of Rs 54 crores.

4.7.5 Investment in Rural Sanitation

Rural sanitation status in the country as a whole is not very encouraging. 54th round of NSS indicates that only 17.5% population use latrines. Status of Karnataka is no different. Major programs carried out in sanitation are *Nirmal Grama Yojana, Swachgrama Yojana* and Total Sanitation Campaign. Besides, most of the externally aided projects also had a sanitation component. Total Sanitation Campaign is a centrally sponsored scheme being funded outside state budget.

4.7.5.1 Nirmal Gram Yojana

The state commenced an exclusive rural sanitation project under Nirmal Gram Yojana in 1995. The program concentrated on promoting construction of HHL in rural areas through providing subsidy of Rs 2000 for BPL families and Rs 1200 for APL families. Till 2004-05 more than 10.30 lac HHLs have been constructed in the state. However it is interesting to note that annual allocations under the program have been on decline consistently as shown in Fig. 4.7.4. Effective FY 2005-06, the allocation for the project has become an integral part of the state's contribution to Total Sanitation Campaign.



Fig. 4.7.4 Allocations under Nirmal Gram Yojana

n improvement project in 1300 villages at a total projected cost of Rs 260 crores under a scheme called *Panchsutra*. The program is being funded through a HUDCO loan of 80%, 10% contribution from the community and 10% by the state government. Under the project, community contribution can be partly in cash and partly in kind. The project is a comprehensive sanitation program of a village with five components viz. covering paved roads, sullage and storm water drains, individual household latrines, community compost yards and smokeless *chullahs* for every household. Each village gets an allocation of around Rs 20 lac.

Till FY 04-05, Rs 195.5 crores were released under this project. Work has been completed in 286 villages. The state plans to further enhance the reach under this program by covering additional 1000 villages.

4.7.5.3 Total Sanitation Campaign

Gol has sanctioned almost Rs 325 crores under Total Sanitation Campaign for all districts, including the 3 pilot districts of Mysore, Bellary and Dakshina Kannada. The program covers



Individual Household latrines, school sanitation, *Aanganwadi*, Women Sanitation Complex and environment sanitation including Drainage,

Garbage and soak pits. The state has set a target of construction of 4.8 million individual household toilets. The program, which initially commenced under SRP, has till Sep'05 incurred a total expenditure of only Rs 10.90 crores.

Subsidy amount available under TSC is only Rs 500 per household as compared to Rs 2000 under Central Rural Sanitation Program. The basis of shift in focus from subsidy to IEC, Human Response Development and Capacity Building, is based on the results of a comprehensive baseline survey undertaken by Gol in 1996-97. The survey indicated that privacy and convenience were the main motivating factors for having an individual latrine and only 2% households adopted latrines due to provision of subsidy.

However, there are some policy differences on provision of subsidy. There is a subsidy of Rs 2000 for HHL under *Indira Awas Yojana* and for school sanitation besides zero contribution under SSA. Whereas, under TSC, 10% community contribution is necessary. These policy differences need to be considered and streamlined in lines with TSC program at Gol level.¹⁵ Considering the different guidelines, GoK has provided some specific measures, under which, it provides 20% rebate on property tax, as an incentive to household who opt for HHL.

4.7.6 District-wise Investments in RWS Sector

It may be interesting to note that during 1995-96 to 2004-05, Karnataka has invested around Rs 458 per capita in the RWS sector. However, there are regional variations in investment by the GoK. It is clear that per capita investments in southern plains are much lower than other regions. Fig 4.7.5 presents region-wise investment.

Fig 4.7.5 Region-wise Investments in RWS Sector

The possible reason for the disparity could be that the "better" regions (with high per capita investments) had some specific programs. For example, in the region of Northern Plains (Rs 490 per capita), World Bank funded *Jal Nirmal* project is being implemented in 10 of the 11 districts and the Sector reform Program in the remaining district of *Bellary*. In the Coastal region (Rs 589 per capita), which consists of only three districts, Sector Reform Program has been implemented in *Dakshina Kannada*, while *Jal Nirmal* project is being implemented in Uttar Kannada.

The central assistance under ARWSP and state contributions under NRWSP or Minimum Need Program have constituted the main bulwark, both in *Malad* region (total investment Rs 432 per capita), as well as in South Plains region (total investment Rs 397 per capita investment).

¹⁵ http://ddws.nic.in/agenda_minutes.htm

District-wise investment in the sector, as presented in Table 4.6.5, indicates considerable variation among the districts. Following Table provides per capita investment in rural water sector from 1995-96 to 2004-05, a 10 year period.
SI.N o.	District	Investment Rs/capita	SI. No.	District	Investment Rs/capita	SI. No.	District	Investment Rs/capita
1.	Dharwad	922	10.	Bellary	461	19.	Hassan	375
2.	Bidar	842	11.	Chikamaglur	437	20.	Gulbarga	371
3.	D. Kannada	756	12.	Shimoga	430	21.	Udupi	371
4.	Banglore(U)	737	13.	Mandya	412	22.	Haveri	364
5.	Mysore	643	14.	Chitradurga	412	23.	Tumkur	316
6.	Kodagu	609	15.	Bijapur	406	24.	Kolar	307
7.	U.Kannada	577	16.	Banglore (R)	404	25.	Bagalkote	301
8.	Belgaum	571	17.	Gadag	382	26.	Chamraj Nagar	252
9.	Raichur	476	18.	Koppal	378	27.	Davangere	198

Table 4.7.3 District wise Investment in RWS Sector during last 10 Years

To further analyze the reasons for this variation, the investment under various major schemes has been considered. Out of state's average of Rs 458 per capita, Rs 340 is relating mainly to ARWSP/NRWSP schemes, while Rs 118 is for *Jal Nirmal* and sector reform program and *Swajaldhar*a. Generally it has been observed that the districts, where *Jal Nirmal* or the sector Reform Program has not been implemented had lower per capita investment in the sector.



towards this per capita investment. As can be seen almost 75% investment has been funded under centrally sponsored ARWSP and state contribution under MNP program and certain other bilateral programs. *Jal Nirmal* has provided around 18% of the funds and remaining resources have come from Sector Reform Program and *Swajaldhara*. Annexure 4.7.3 provides details of the above calculations.

4.7.7 Resource Outlook

Major sources of funds in the RWS sector are from central Government, state Government and The World Bank. The state budget for the sector amounts to about Rs 550 crore (FY 04-05: Rs 540 cr; FY 05-06: Rs 555 cr), including central Govt. allocation towards ARWSP, PMGY and Sub-Mission projects. On average, the state allocation in recent years has amounted to around 3.5 - 4% of total developmental plan. Considering the fact that there has been a regular increase in the state's development plan expenditure, the present fund allocations are likely to be maintained.

4.7.7.1 State's Annual Development Expenditure

While comparing the state's allocations to the RWS sector, one must consider the size of the overall growth in the annual plan. While there has been a steady increase in the Plan

expenditure of the state, however when one compares the pattern of increase in Plan expenditure from year to year, there is considerable variations. For example the highest growth in annual plan expenditure was in 1993-94 when it grew by more than 34%, while in 2002-03 the growth was less than 2%. The blue line in the chart below indicates the variations in annual growth in plan allocations.

However when one compares the growth in annual Plan expenditure of the state from a fixed base of 1991, it is clear that the state has not been able to maintain this growth. The decreasing trend in growth of Plan Expenditure since 1991, represented by Pink line in the Figure is clearly discernible. The rate of annual Plan growth, which was as high as 31% in 1991-92 has been consistently on decline ever since and as at FY 03-04 is about 16% only. Hence while it can be stated with confidence that the state is likely to maintain its present expenditure pattern for the sector, there is some uncertainty about the exact growth in the allocation for the sector.

4.7.7.2 Central Funds

Besides the state, Gol has also allocated funds for centrally sponsored schemes such as *Swajaldhara* and TSC. During last 3 years, the allocation for Karnataka under *Swajaldhara* has beenabout Rs 12-13 crores per annum. In addition to these, Twelfth Finance Commission has allocated Rs 20,000 crores for allocation to PRIs. The share of Karnataka has been Rs 888 crores over a 5 year period, which is about Rs 178 crores per annum. The Commission has stated that the PRIs should use these funds to improve service delivery of assets created under water supply and sanitation programs, particularly under *Swajaldhara*.

4.7.7.3 World Bank Projects

In addition to above, currently *Jal Nirmal* program being funded by World Bank has gained significant momentum. In current year, it is likely to utilize almost Rs 300 crore. The Total project outlay for the project is Rs 1035 crores. In addition the World Bank is currently funding Karnataka's Tank Management Project and Watershed Programs, which would ultimately contribute in sustainability of drinking water sources in rural areas.

4.7.8 State's Financial Needs for the Sector

In the Master Plan prepared by GoK in the year 2000, the state has identified the total needs for the RWS sector at Rs 2650 crores¹⁶. The resource requirement was mainly for two activities: First, for upgrading partially covered habitations to a minimum of 55 lpcd at an investment of Rs 1482 crores and Secondly, to tackle quality in affected habitations at an investment of Rs 1162 crores. It was planned that the investments would be met from the following resources

State funds under MNP and central funds under ARWSP	- Rs	1200 crores
WB Funds (Jal Nirmal Project)	- Rs	1000 crores
Sector Reform Program	- Rs	200 crores
Other Externally Aided Programs (Danida etc.)	- Rs	100 crores
User Community	- Rs	150 crores.

While the state and central funds have been on target, the WB program is still behind schedule and the expenditures so far is about Rs 300 crores only. Similarly, under SRP only Rs 120 crores have been allocated. *Swajaldhara* program also has been on a much smaller scale. Further, no major bilateral assistance projects have materialized under other externally aided programs. Even the continuing program like Danida has also withdrawn its

¹⁶ Strategy Paper 2000-05 issued by RDPR in Oct'2000

operations from India. The outlook under these bilateral projects is not too promising. The community contribution was directly linked to the programs having community participatory approach (*Jal Nirmal, Swajaldhara* etc.). However, with both programs still behind schedule, around, so far only Rs 35 crores has been collected. With increased momentum under *Jal Nirmal*, the amount is likely to increase. Overall, the progress in fund availability needs improvement.

4.7.9 ABC Analysis

RDPR undertook an ABC analysis of interventions required in the sector to reach an optimum level. This analysis is summarized in Table 4.7.4, which indicates the fund requirement of RWS sector at 1881.53 crores. The analysis was undertaken in 2000 and there is a need to review the same. For example, GoK has recently submitted a new submission program to GoI amounting to nearly Rs 2000 crores. Also the Sector reform program mentioned above has either been completed or transferred to *Swajaldhara*.

4.7.10 Cost Sharing & Community Participation

Traditionally government has taken overall responsibility of maintaining all WSS schemes. However it realized the shortcomings of this approach, as it often led to dereliction of the WSS. Therefore, GoK has consistently moved towards an approach, seeking community ownership of the created assets. Through a number of EAP projects, it experimented and demonstrated the practical ways to implement such an approach. Similarly, Gol under SRP also experimented with similar principles. GoK further used the same approach for *Jal Nirmal*.

In this regard, it may be noted that till date most of the projects, which used community contribution as its strategies, have been fairly successful in collecting the contributions. Since the adoption of community participation for capital cost sharing, the state has been able to raise almost Rs 35 crores. Under the *Jal Nirmal* project it has been able to raise funds till July'05 amounting to almost Rs 21 crores. Similarly under the Sector Reform Program, which was basically on the similar principles, approximately Rs 10 crore was collected. Under *Swajaldhara*, funds of Rs 3.56 crores have been raised from the community.

The definition of community has often been debated, while generally the programs identify community as stakeholders who will receive water and hence require that these stakeholders should provide the community contribution. Based on discussions during our field visits it has been observed that community contribution has been provided by a mix of users, local politicians, corporate houses having large number of employees among the community,

Category	Particulars of Interventions	Rs, crores
Intervention: A	1. Reviving of 1475 PWS schemes	29.50
Undertaking	2. Reviving of 2250 MWS schemes	38.25
rejuvenation/repair of	3. Retrieval of 6207 bore-wells with hydro-fracturing	6.21
12142 schemes/ borewells	4. Drilling of 2210 new bore-wells	
for handing over to PRIs	Sub –Total	<u>11.05</u>
		<u>85.01</u>
Intervention: B	5. Completion of ongoing 2122 MWS schemes	59.41
	6. Completion of 2240 ongoing PWS schemes	155.97
Completion of engeing	7. Completion of on-going water sector reform	62.36
Completion of ongoing	programme	<u> </u>
RWS schemes	Sub –Total	<u>277.74</u>
Intervention: C	8. New MWS – 5977	268.97
New schemes to be	9. New PWS – 7004	770.44
undertaken at PRI level to	10. Swajaldhara	84.23
provide 40 lpcd to the	11. Sector Reform Programme (balance)	51.28
balance of Partially	12. Sub-Mission schemes – 53 schemes approved	<u>343.86</u>
covered habitations	Sub –Total	<u>1518.78</u>
	Total (Rs in crores)	1881.53

Table 4.7.4 ABC Analysis for Assessment of Fund Requirements

local businessmen interested in winning confidence of the community. Though not so widespread, however instances were also observed where community was interested in awarding the contract of installation of water supply scheme to a contractor who would take responsibility of the community contribution. (RGDWM defines some guidelines). The below figure 4.7.7 provides the community contribution for major rural water programs.

4.7.11 Fiscal Decentralization

Karnataka is a pioneer state in governance through decentralization. It was the first state in the country to enact the *Panchayati Raj* Act in 1993. Politically, there is a broad consensus in favor of decentralization. From the current financial year it has taken major initiatives in transferring functions, finance and functionaries to the PRIs. The state is one of the two

states, who have transferred all 29 subjects listed in the constitution to the PRIs.

In principle, GoK has recognized PRIs as the main implementers of RWS projects and the role of RDPR as technical supervision and monitoring. A Government Order (No. GRAAAPA 146 YOUMOU



dated. 16-10-2004) was issued during 2004-05. Accordingly all schemes dealing with the 29 subjects referred above to have been transferred to the PRIs from the current financial year. Out of a total of 442 schemes, 333 Plan schemes are to be implemented by the 3-tiers of the PRI institutions, and GPs implementing 36 schemes, which till FY 2004-05 were only 4. Thus from the current financial year, Plan allocation of PRI institutions, with certain exceptions, has more than doubled to Rs 3521 crores from Rs 1595 crores last year. Out of this allocation to PRIs, 44% (1549 crores) would be implemented at the GP level, 22% (764

crores) would be implemented by *Taluk Panchayats* and 34% (1207 crores) would be implemented at ZP level. The government's intention of the decentralization process is quite clear, certain transit issues, particularly relating to Water sector in transfer of these funds to Districts need to be resolved.

4.7.12 Operation & Maintenance

Historical Background

One of the major reasons for initiating Sector Reform Program in the water sector by Gol was non-sustainability of water structures being created under different programs. As per one estimate, over 3.5 million hand-pumps and over 100,000 PWS schemes have been installed in the country under RWS. Based at 10-15% annual cost of maintenance would be around Rs 2000 crores.¹⁷ In Karnataka till 1987, the maintenance of rural water supply schemes was fully under the control of State Public Health Engineering Department (PHED). At *Taluk l*evel the O&M of various water schemes was with the sub-divisions of this Department. After 1987, O&M responsibility was transferred to then *ZP* Engineering Division/sub-division. Karnataka *Panchayati Raj* Act 1993 vests the management of Drinking Water Supply & Sanitation to *Gram Panchayats*. From April' 2000 onwards, the state shifted the responsibility of O&M of all schemes with power operated pumps to *Gram Panchayats*. Effective April'04, even the maintenance of hand-pumps has become the responsibility of the *Gram Panchayats*.

Financial Grants

At present the state government provides grants for maintenance based on the annual norms of Rs 600 per Hand-pump, Rs 3500 per MWS and Rs 8000 per PWS.

Water Pricing Policy

By a Government Order of Nov. 2002, the minimum amount that a VWSC/GP must recover for water collection was prescribed @ Rs 25 per household connection and Rs 10 per household collecting water from Public Stand Posts. However, collection of tariff requires major effort. A rationalization of GPs finances and tax collections (including water tariffs) in 2002-03 resulted in Rs 119 crores collection by GPs as compared to only Rs 70 crores in the previous year.¹⁸

Data Collection on O&M

Presently, there is no formal system at the state level for compilation of the O&M expenditures of various water schemes. The major reason for this is both lack of authentic data as well as the system. This is because the PRIs, which are incurring the O&M expenditure, are not required to report on this aspect, as there is no formal mechanism to collate and collect such data. At present, even at GP level the O&M data is not readily available, as it gets subsumed within GP's overall expenditure and no separate account heads are maintained. However, with new regulations, a VWSC would exclusively be responsible for O&M of water schemes and maintain separate account for O&M expenditures and revenue collections, it should be possible to undertake better analysis.

Though, even in proposed system, there are a few wrinkles, which need to be resolved before long. With one VWSC becoming responsible for all the schemes under a GP's jurisdiction, a VWSC would need to keep scheme-wise costs, and determine scheme-wise

¹⁷ Chapter 5.5, 10th Plan, Gol

¹⁸ Presentation by KRWSSA on O&M policy, Sep'05

contributions. (VWSCs need to maintain Scheme-wise accounts) With limited capacities at the community level, this could become a practical problem. There is an immediate need to develop proper mechanism combined with suitable capacity-building measures to overcome such problems.

The *Jal Nirmal* project, which is far better organized in terms of reporting and data collection, generates information about O&M expenditure and collections. As per available information, the collections at best have been around 35% of the annual O&M expenditures, while under Batch I worst collection is around 4%. Table 4.7.5 provides district-wise details of annual O&M estimates with actual collection till July'05.

Districts	Annual O&M Expenditure, Rs	Actual Collection Rs	Collection Efficiency, %
			(can be up to 50%
Batch I			
Bagalkote	6091849	1723498	28%
Belgaum	5109676	1541511	30%
Bijapur	4409226	694805	16%
Dharwad	7142155	475708	7%
Gadag	4652600	1639195	35%
Gulbarga	8526886	2057676	24%
Haveri	6517903	245197	4%
U.Kannada	3254001	683368	21%
Sub-total	45704296	9060958	20%
Batch II			
Bidar	12696413	2914229	23%
Koppal	2846100	461822	16%
Raichur	2601780	0	0%
Sub-total	18144293	3376051	19%
Grand Total	63,848,589	12,437,009	19%

Table 4.7.5 Annual O&M Estimates and Collections till Sept 05 (half year)

There are different reasons for these variations in collections. Of course, many of the schemes are still not complete or have been recently completed. Collection mechanism is still not in full gear. Therefore, it is very difficult to analyze much from the available data. However, it could be said that while the collection is a critical factor in the success of participatory approach, ensuring financial sustainability to the schemes is not likely to be easy and would need a lot of capacity building and preparation of the communities.

During the field visits, it was observed that in most cases either the schemes were yet to be transferred to VWSCs or were recently transferred. Although estimated O&M expenditure data and estimated collections were normally available, however the actual figures were not readily available. In the district of Gulbarga, where such information was available for certain individual schemes (Refer Table 4.6.7), the above trend of low collection compared to actual O&M expenditure gets corroborated.

The O&M expenditure can be categorized into four major heads of expenditures, i.e., electricity costs; operator and bill collector's salaries; repair & maintenance expenditure of pumps, pipes; and water quality improvement expenses like, chlorination tablets, water

testing expenses, etc. The data collected from the field for the above schemes has been plotted and presented in Fig. 4.7.8 below. This indicates that the electricity charges are the largest component of O&M expenditure, amounting to 55-60%. The second major component is repairs and maintenance of pump, valves, pipes etc. This ranged between 20-25% of the total O&M cost. Salaries of the pump-operator etc. are about 15%, while the balance 5% is mainly used towards treatment of water.

Location	Type of Scheme	People Served	HH/PSP Connection s	Tariff, Rs/month		Annual O&M Expendit ures	Actual annual Collection	Collectio ns as % of Exp.
				нн	PSP			
Gulbarga [District, Gundagurti C	βP						
GundaGurt Vard, A)	i PWS (JN): Open Well + .5 lac ltr OHT	3694	175/635	30	10	219,502	36,970	16.8
Belguwpa B)	PWS (JN): Dpenwell + 0.75 lac lt DHT	1630	67/257	30	10	109,385	8,660	8.0
3weel C)	PWS (JN): Borewell + 1.0 lac lt DHT	2100	42/338	30	10	92,697	10,316	11.1
/lalkood D)	PWS (JN): Borewell + 0.75 lac lt DHT	1550	37/225	30	10	91,821	8,321	9.1%

Table 4.7.6 Typical Field Data on Water Tariff, O&M and Actual Collections





Further, analysis was undertaken to calculate an optimum monthly tariff rate based on O&M expenditure based on district-wise data, as above. While calculating this, a number of factors need to be considered. The most important factor is the affordability of he community. While fixing the minimum monthly tariff of Rs 10 and Rs 25 for PSP and HH, the affordability appears to have been considered by the government. This issue is quite relevant to ensure equity among different sections of the society, particularly the BPL. In line with this, Govt. has recently issued a circular dated Oct 15, 2005) to subsidize the GPs, which incur expenditure, in excess of an average of Rs 40 per household. The state Govt. seems to be particularly concerned that in case of Multi-village schemes, O&M expenditure is likely to be higher and it may be difficult for individual household to meet this obligation entirely.

The financial sustainability of a scheme can be achieved only if large number of users contributes towards O&M of a scheme, making individual Tariff rate affordable. As per the District-wise data provided it has been observed that majority of users in a district fall in the Public Stand Post category, in fact as per the data available, more than 82% users in the 11 districts identified in the Table above fall in the PSP category.

Different options were considered for understanding the effect of number of PSP connection holders on monthly tariff of Household connections. In case the annual O&M expenditure for the 11 districts is divided equally among all the participants, i.e. equally among PSP users as well as HH users, average monthly tariff works out as Rs 16 only.

If PSP connection holders pay a tariff of Rs 10, average tariff of HH connection holder increases to about Rs 45 per month, though wherever HH connection-holders would be low, their individual contribution would rise significantly. For example, in case of Koppal, where HH connections are only 5% (704 in numbers), the monthly tariff shall rise to Rs 139.

In case the tariff of PSP connection holders increases to Rs 15, the monthly tariff for HH connections reduces to only Rs 21. The district-wise details of these options are presented n Table 4.7.7. It can be observed that under this option, in case of some districts, the contribution becomes negative, as the overall contribution from PSP connection becomes more than the annual O&M expenditure. In such cases, the contributions from PSP connections from PSP connections must be limited to Rs 10 per month only.

Table 4.7.7 District wise	Change in HH Tariff	with Change in PSP	Tariff
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Districts	No. of HH	нн	PSP	Monthly Tariff
	participants	Connections	Connections	Rs/ month

				lf O&M is	sHH Tariff,	HH Tariff,
	Nos.	Nos.	Nos.	charged	if PSP Tariff	if PSP Tariff
				equally to	is Rs 10 per	is Rs 15 per
				all	month	month
				connections		
Batch I						
Bagalkote	28874	4728	24146	17.58	56.30	30.77
Belgaum	43807	6856	36951	9.72	8.21	-18.74
Bijapur	35820	8249	27571	10.26	11.12	-5.59
Dharwad	28547	5564	22983	20.85	65.66	45.01
Gadag	37596	8837	28759	10.31	11.33	-4.94
Gulbarga	41849	4211	37638	16.98	79.36	34.67
Haveri	27343	4716	22627	19.86	67.19	43.20
U.Kannada	22678	1148	21530	11.96	48.66	-45.11
Sub-total	266514	44309	222205	14.29	35.81	10.73
Batch II						
Bidar	36251	11662	24589	29.19	69.64	59.10
Koppal	14633	704	13929	16.21	139.04	40.11
Raichur	13180	1273	11907	16.45	76.78	30.02
Sub-total	64064	13639	50425	23.60	73.89	55.40
Total	330578	57948	272630	16.10	44.77	21.25

From the above analysis it is clear that to optimize the total collections, one will need to have a mix of tariff-rates, which are both equitable and affordable. However, one may note that all above calculations are based on 100% recovery, though desired, but this assumption is certainly not feasible. Based on available data, average Household Tariff was considered for different ranges of recoveries and the same is presented in Fig 4.7.9. This indicates that for HH tariff to be within reasonable/affordable range, high recoveries are essential, indicating need for strengthening capacity of VWSCs & GPs towards the same. The blue line in the Figure indicates the household tariff required to meet annual O&M expenditure when PSP tariff is Rs 10 per month, while the pink line indicates slightly less HH tariff, in case the PSP tariff is raised to Rs 15. As can be expected the reduction in HH Tariff is slower as the recovery reaches in the region of 80-90%. The reduction is far quicker between 40%-70% recovery range.



Fig 4.7.9 HH Tariff Rate for Different Recovery Rates for Different PSP Rates

8 Source Sustainability

The most important reason of failure of many water supply schemes has been the nonsustainability of sources. This has resulted in abandoning of he schemes, financial losses, inconvenience etc. This has causes many fully covered schemes to be re-designated as partially covered schemes etc. Although in some instances, the reasons of scheme failure include improper design and assessment of population but in most cases, the source of water supply has been the focal point. The reasons of failure include poor rainfall resulting in dwindling water table as well as over exploitation of nearby sources for non-drinking (agriculture, industrial, etc.) purposes. In many instances, with this the quality of water also became poor. Therefore, source should be sustainable both from quantity and quality considerations. To improve the scenario, GoK has enacted laws aiming to control/regulate other uses (which has been discussed under legal). However, preventive measure like recharge initiatives and curative measures like hydro-fracturing etc. need to be pursued. The section provides details of such measures and status of their implementation.

4.8.1 Artificial Ground Water Recharge Techniques:

Artificial recharge methods can be initiated and adopted, whenever, it is detected that there is

- 1. Lowering of ground water table (dwindling on long term basis)
- 2. Imbalance in ground water systems like occurrence of de-saturation of aquifers
- 3. A threat to ground water sustainability
- 4. An adverse environmental impact and resource crunch

The basic requirements for such initiatives include the availability of non committed surplus monsoon run off in space and time and conducive hydro geological setups like aquifer thickness, availability of sub surface storage space, highly weathered and fractured sub strata etc. The suggestions don't preclude use of ground water recharging techniques for protection of the source or for increasing the life of the source).

4.8.2 Ground Water Recharge Techniques

As all of the recharge techniques use rain water, in its simplest nomenclature it is also called rainwater harvesting. A number of artificial ground water recharge techniques using rain water are:

- 1. Percolation points: These are feasible and effective in alluvial top soils with highly fractured hard rock substrata. They can be used in combination with injection wells, shafts and dug wells
- 2. Check Dams and Nalla Bunds: These can be constructed across small streams with gentle slopes at locations where enough thickness of permeable weathered formations is available and there can be confining storage on the nalla course. The height of construction is normally limited to 1-2 meters to avoid large submergence as well as from cost considerations.
- 3. Modification of village Tanks: As an age-old convention, every village used to have one pond/ tank. However, with time most of them have become silted or have been encroached upon. Under the method, village tank beds can be de-silted and a waste weir be suitably installed to hold rain water. This technique is suitable, when drinking water source is located on the down stream side. This technique is being used under *Sujala* Water Shed Development activities.

- 4. Dug well Recharge: Under this, existing dry or abandoned dug wells, close to the drinking water source can be used and the surface runoff diverted into them (naturally or artificially). This not only recharges ground water but also reduce soil loss.
- 5. Point Recharge Structures; Under the technique, the fractured aquifer is recharged directly through bore wells with the source of water either from a tank or a stream where rain-water is stored or flowing. Bore well with slotted casing in weathered zone is installed, which is further surrounded by reversed filter pebbles and sand. This should have arrangements to divert the water from the tank (stored rain water) or from the flowing stream. These are most suitable where the terrain has major or minor lineaments and under-laying formations are fractured or highly jointed.
- 6. Sub surface dykes or dams: Normally, these are macro level ground water recharging structures and are more suitable in alluvial areas and highly weathered formations across streams with narrow valleys in hard rock terrain. The ideal sites could be nallas up to 100 meter in width but with 6 to 8 meter weathered zone below the bed. *Kagina* river bed in *Gulbarga* district, major streams of *Bidar* and *Humnabad Taluks, Hagari* River in *Bellary* and *Chitradurga* districts are best locations for such sub surface dykes or dams.
- 7. Other commonly used techniques include Recharge pit with bore well, Recharge trench with an abandoned bore well, Infiltration wells and *Gokattas* or similar recharge measures.

4.8.3 Roof Rain Water Harvesting Techniques;

It generally consists of collecting rain water falling on the roof of the buildings. The rainwater is then stored in sumps after passing through sand filters and then diverted to existing bore wells or open wells or infiltration pits or trenches for ground water recharge. As the roof catchments are relatively cleaner and are free from contamination as compared to normal catchments (ground), the water quality is far better. Therefore, the rainwater could also be directly used as drinking water, provided precautions have been taken to maintain the surface of the roof clean.

4.8.4 Open dug wells With Horizontal Tunnel in Laterite Substrata:

Under this, large diameter open well are dug out in laterite sub strata or in highly weathered sub strata for depths up to 15-20 meters in regions of high ground water tables with impervious steining 9-10 meters and with perforated concrete vents of 45 cm depth at intervals of one meters depth to allow ground water seepage. In laterite substrata with impervious steining of 9-10 meters depth, horizontal tunnels are radially dug for 5-8 meters length. This technique is followed to enhance yield of dug well and is being practiced in Bidar district.

4.8.5 Infiltration wells with connecting pipe in sandy beds of rivers with Jack well cum Pump House on the Banks

Infiltration wells of 4-6 meter diameter with impervious steining up to 5-6meters depth are sunk in deep sandy beds of perennial river beds and streams and water is drawn from this well through a pipe, connecting this to a jack well cum pump house on the banks of a river or stream.

In some cases instead of an infiltration well perforated pipe gallery covered all-round with graded reversed filter media located below the scour depth of 6 to 8 meters below bed is provided directly across the stream and below the bed of the river and is connected to a collector well with pump house. This technique is followed in the sandy beds of River Kagina, Malaprabha River sandy shoal beds, and Cauvery river beds. Disinfection of water is an invariable necessity in such ground water extractions

Table 4.8.1	Progress of	f Construct	tion of GW	Recharge S	Structures	s Under Jal	Nirmal Pro	ject		
District	Units constructed till Aug 31, 2005									
	Check Dams	Point Recharge Pits	Point Recharge Shafts	Pond/ Lake De- silting	Sub surface Dykes	Percolation Tank	Other Recharge structures	Total GW Recharge Structures		
Bagalkote	1	55	0	0	1	0	1	58		
Belgaum	7	39	0	1	0	1	7	55		
Bijapur	0	45						45		
Dharwad	10	69	16	4	5	10	133	247		
Gadag	8	37	0	4	2	0	0	51		
Gulbarga	6	15			1		3	25		
Haveri	0	172		5			1	178		
U.kannada	0	151		1			2	154		
Batch-1 Total	32	583	16	15	9	11	147	813		
Bidar	3	0					11492	11495		
Koppal	1	50						51		
Raichur	0	25	8					33		
Batch-2 Total	4	75	8	0	0	0	11492	11579		
G. TOTAL	36	658	24	15	9	11	11639	12392		

During earlier years, very little efforts were made towards GW recharge structures. However, considering the experiences, efforts have been made under Jal Nirmal project to include such structures as part of the program. The progress of various ground water recharge measures under *Jal Nirmal* project is presented in Table 4.8.1.

4.8.8 Hydro-Fracturing

This technique cannot be directly termed as leading to source sustainability but more as a source revival technique. With indiscriminate use of groundwater sources certain existing bore-wells starts getting dried up due to decreasing recharge. Through hydro-fracturing technology, these bore-wells can be retrieved/ revived. RDPR for last few years has been active in using the hydro-fracturing units to revive the wells. During 2004-05, with 10 HF Units, 1,204 bore-wells were hydro-fractured. With 1,147 wells getting revived, the success rate has been more than 95.3%. Table 4.8.1 provides the progress of hydro-fracturing during last 3 years.

		•	•	
Year	Number of bore- wells hydro- fractured	Number of successful bore wells	Number of failed bore-wells	Success rate , %
2002-03	902	778	124	86.3
2003-04	1152	1043	109	90.5
2004-05	1204	1147	57	95.3

Table 4.8.2 Year wise Achievements under Hydro-Fracturing

9 **Gender Integration and Empowerment**

The project concept document on community based rural water supply and sanitation programs of the RGNDWM of 1999 of the Ministry of Rural Development clearly emphasizes and states the envisaged role of women in the drinking water and sanitation program. Further, Gol under its various programs have constantly been making efforts to involve and empower women into its various development activities. However, at the village level, it has attained only limited success. The empowerment of women requires their active role in decision making and sharing the benefits of the development efforts. Although it is very difficult to measure gender integration and empowerment but can be pursued through Composition in VWSSC, Office bearer ship and Empowerment agenda.

Besides, using persuasive techniques, GoK have also used legislative measures. The RWSSP project envisages empowerment of the women/community through VWSSC and the Gram *Panchayat*. The program envisages that participation will result in responsibility sharing and thereby empowerment. Formation of user groups comprising of women in each village is made mandatory under the project. In support of the decision, the guidelines for VWSSC are issued, wherein, the VWSSC shall function as a sub committee/functional committee of the GP {G.O dated 3-5-2005, which is in conformity with Section 58 and Section (1-a) of KPR Act 1993 (as amended)}. Further it is also made mandatory that a minimum of 1/3 of the members of the VWSSC will have to be women and a minimum of one office bearer should be a woman. The guidelines also suggest flexibility in approach to accommodate the concept depending on the local situation.

The overall objective of the current RWSSP is to improve the user ownership and ensure sustainable water supply and sanitation conditions by proper maintenance of the systems. It is envisaged that by enrolling women from all sections of the society into the mainstream of water supply maintenance and by addressing the immediate objectives of "sensitizing women to take active role in the process of maintenance of water supply and sanitation systems" a sense of empowerment and ownership responsibility among the users will be created. The guidelines recommend that this would be achieved during the initial "sensitization and identification phase' of 12 months for optimum results. The GoK has adopted the concept in water supply and has extended the same criterion to the Total Sanitation Campaign also.

Issues

The program vehemently supports the empowerment agenda drawing support from the PR Act and 73rd and 74th Constitutional Amendment Bill. Efforts are made across the VWSSCs to bye and large adopt the norms. However, the execution of the same has not been very successful. The level of understanding and the unwillingness of the community are often quoted as major stumbling blocks. However the unwillingness on the part of the implementing agency to address the issues head on and provide measures to overcome the problem perpetuates the situation

4.10 Information Management

Under the demand responsive reform initiatives the project management, from planning to operation and management, of drinking water supply schemes becomes very important as schemes are functioning at village level and across different regions and different communities. Therefore, to monitor the progress of such large scale operation, in a community driven mode, adequate information management (two way) is very critical. It not only permits monitoring of the project but also provides feedback on the practices and processes followed for project.

KRWSSA has taken up the responsibility for monitoring the progress at all levels through a computerized MIS system. The major activities to be monitored include both physical and financial progress as well as milestones in the scheme cycle. An external consulting firm has been hired to support KRWSSA in its monitoring and evaluation exercise. An on- line system of information flow has also been designed from GP to DSU to KRWSSA.

However, in its implementation, following field level problems were encountered:

- Staggered procurement of hardware and peripherals at GP level
- Less than satisfactory e-connectivity between the offices, leading to problems in receiving/transmitting information.
- Delay in staffing and low level of capability of staff at the GP levels, thus causing delay in capacity building of the staff to meet the project objectives.

Further, as all activities takes place at village level, data needs to be initially collected at this level and then compiled in requisite formats (Excel formats) at GP level and periodically sent to ZP-DSU for data input in a customized software. After compilation at ZP level, the information is periodically sent to KRWSSA electronically for consolidation, monitoring and review of the progress.

Under *Jal Nirmal* project, as a part of project planning SAs are supposed to prepare the GP level baseline survey report and community level baseline report at the start of the project besides the time use analysis report and health survey report. After that it has to provide monthly progress reports. Besides this, the SAs are supposed to repeat the time use survey and health survey after each six months and submit the findings to KRWSSA through DSU.

During project implementation, each month SA should submit the construction quality report, progress monitoring report and process monitoring report. In addition, water quality report is to be submitted at the time of commissioning of the water source and thereafter each six months. These reports are again submitted to DSU, which after compilation sends it to KRWSSA.

Apart from this formal reporting, the SAs, all DSU staff and GP representatives assemble once a month at the DSU office for the District- wise review meeting usually chaired by the district Project Manager. This is used as a platform for not only reporting and reviewing, but also for learning as best practices are shared during these sessions. Any constraints and limitations in planning and implementation are also discussed during collective brainstorming. Thus, apart from learning, there is also a bonding formed among the different stakeholders during these meetings.

There is also a monthly review meeting at the State- level Chaired by Secretary, RD&PR/ Director, KRWSSA. This is attended by the DSU staff, ZPED Engineers, SA/NGO representatives (usually the Team Leader, Senior Engineer and Community Development Specialist) and Officials of KRWSSA as well. This assists in taking stock of the situation, developing project momentum, problem solving and exchange of best management practices, and for on course corrections etc. The feedback provides input for making specific policy decisions to support the project planning and implementation.

Besides these, there are regular field visits by the officials from the DSU to Taluk/GP/Schemes. Apart from these KRWSSA officials also frequently visit specific schemes and have a feedback. Corrective action, wherever found necessary, is taken by the DSU and the field level staff.

One of the advantages of the information management (including informal information exchange) has been the reduced response time for corrective actions and better project implementation. These could be said as the most positive features of the information management aspect of the project.

4.11 Capacity Building

The present policy of GoK on water supply projects in the state is by adopting key reform principles viz., demand responsive, community participation, partial capital cost sharing and 100% operation & maintenance by user groups. However, to carry on such activities, the involvement of various stakeholders is needed. However, most of the stakeholders have been managing the works under supply driven regime. The paradigm shift shall require project/scheme management under the above principles. Therefore, there is an urgent need for capacity development of most of these stakeholders.

First, as the lower level functionaries are provided more responsibilities and higher level functionaries start to behave like facilitators, a substantial change in mode of working as well mind set is required. Secondly to manage sector issues, there is an urgent need for capacity building at appropriate levels. The sector issues could include a) Operational/Financial issues b) Technical issues (quality construction, source sustainability, water quality related issues), c) Social development and community integration and (d) institutional mechanism.

Amongst the stakeholders, the *Gram Panchayath* shall be the focal point for project implementation and will be primarily responsible for planning, implementation, operation & maintenance of rural water supply and sanitation systems, with the technical support of Zilla Panchayath Engineering Sub-division. The GP/VWSC will decide the type of scheme, technology and water supply and sanitation facilities. The project fund will be released by KRWSSA to the Zilla Panchayaths for further release to *Grama Panchayaths* who will make payments for all the project activities. The capacity of the GP/VWSC will have to be strengthened to manage the above responsibilities in an efficient and effective manner.

Therefore the target groups for CB activities consist of:

- Apex/policy level compromising administrators, policy makers (including elected representatives & the KRWSSA officials, to create an enabling environment for formalizing the project's key principles;
- Strategic, comprising mainly KRWSSA and other associated government departments, to promote and facilitate in campaigning the project's approach.
- Intermediary/program level, comprising ZPs, TPs and support agencies officials, who are to provide technical assistance to grass-root level agencies; and
- Grass-root/project level officials, encompassing GPs, User groups, to translate the project's approach into action- designing, constructing, operating and managing, and monitoring the schemes
- VWSC functionaries

Besides the drinking water supply sector, there is urgent need to develop address capacity building for health & sanitation. The primitive method of excreta disposal and poor sanitation beside lack of safe drinking water is a major problem of the rural communities. Nearly 80% of the diseases are either caused due to consumption of contaminated water or poor sanitation. It is largely recognized that the quality of life in the rural community can be improved by providing safe drinking water and sanitation facilities.

Therefore, the Jal Nirmal project focuses to create awareness on water related diseases which in turn generate demand for house hold latrines and its proper usage and maintenance, promotion of village sanitation, achieving an acceptable standard of good personal and family hygiene. In order to achieve the desired results, various communication strategy have been adopted to capacitate the user groups. **Under Jal Nirmal project the**

plan is to capacitate over 1,00,000 persons, 98% of whom will be at/below the District level. This is exclusive of Village Water Supply & Sanitation Committee representatives.

For institutionalizing IEC and HRD activities under the TSC and the Swajaldhara, Communication and Capacity Development Unit (CCDU) has been set up at the State level. The required financial assistance for manpower support and taking up state specific HRD and IEC activities will be provided under CCDU. The strategy is to combine both the HRD and the IEC activities and bring it under one umbrella. The Objective of the CCDU unit is to develop state specific IEC strategy in the water and sanitation sector and also undertake the capacity development of functionaries at all levels. The funding will be from Gol on a 100% basis for the first three years starting April 1, 2004. and on a 75:25 sharing pattern thereafter. The emphasis in a CB Plan should be on the capacity development of the key functionaries. The Regional Resource Centre is the place identified for CB of the key Program Managers and resource persons. It is suggested that the field functionaries should be sent to successful projects for exchange visits.

Under the *Jalnirmal* project resource institutions have been identified for the CB initiatives. Training modules and manuals are prepared. Resource persons to handle grass root level trainings are trained in water and sanitation related issues. In all 3799 training programs were organized covering 124137 participants from the State, District, *Taluk*, Village and the VWSC level. (*Source*- notes presented for the AGM of KRWSSA on 26-9-2005)

Among the institutes used for training of the Rural Development functionaries, the Abdul Nazir Sab State Institute of Rural Development has been a pioneer. Established in 1989, the institute has been imparting training to the elected representatives of the Panchayat Raj Institutions as well as officers of various development departments and representatives of NGOs. The operationalization of the SATCOM Centre in the year 2002-03 (at a cost of 40 lakhs) has resulted in ANSSIRD making far reaching changes to its entire approach, system and curriculum of training. The Satellite Training programs of one day training module for GP members and VWSC functionaries organized through the SATCOM has yielded far reaching results. Through these 18,207 GP members in 1310 *Gram Panchayats* of 44 *Taluks* were trained in the first stage. In the second stage, between October 2003 to January 2005 functionaries of 4,339 GPs belonging to 131 *taluks* have been trained.

The ANSSIRD has in addition tried to reach a wider audience through the *Janadhikara Janandolan Kalajatha* programs. 60 artists of different groups have performed 2,620 programs. Video and audio cassettes of these *Kalajathaka Natakas* have been distributed to the ZPs, TPs and the GPs to facilitate the community mobilization program on their own. The institute has also undertaken the supply of training materials like books (50) on GP members to the TPs, wall papers and charts. In addition, face to face trainings of the ANSSIRD still continue. As presented in Table 4.10.1, the institute had trained about 1231 persons in the year 2004-05, including 31 elected representatives for the PRIs in the area of RWSS.

Year	Face to	Face Train	ings	Number of Participants			
	Class Room Trainings	Computer Trainings	Total	Officers	Non Officials	Total	
2000-01	47	-	47	411	721	1132	
2001-02	58	-	58	895	516	1411	
2002-03	57	3	60	738	1125	1863	
2003-04	46	15	61	1054	425	1479	
2004-05	30	14	44	831	400	1231	
(End Jan)							

Table 4.10.1 Details of Training Programs Conducted in the last 5 years by ANSSIRD

The funding for the ANSSIRD is on a 50:50 basis by the Gol and the GoK. The pattern of allotment and expenditure for the last 5 years is presented in Table 4.10.2. It clearly demonstrates that investment grant from Gol has doubled in the last 5 years and same is the pattern of expenses.

Year	Gr	ants releas	ed	Total Expenditure	
	Ru	ipees in lak	hs	Rupees in lakhs	
	Gol	GoK	Total		
2000-01	22.41	22.41	44.82	44.82	
2001-02	39.14	39.14	78.28	78.28	
2002-03	44.38	44.38	88.76	88.76	
2003-04	48.82	48.82	97.64	97.64	
2004-05	53.70	53.70	107.40	92.82	
(End Jan)					

 Table 4.10.2
 Pattern of Expenditure of ANSSIRD

At the District level the services of the local consultancy/training organizations are also taken in capacity building initiatives, specifically in issues addressed at the local level, which mainly includes O&M etc.

Building Local Capacities for the Design and Delivery of Rural Water Supply and Sanitation Services

An operational guide for municipalities in Honduras

With the approval of the Honduran Water and Sanitation Law, municipalities are given an increased responsibility in the delivery of sustainable water and sanitation services. Municipalities, mostly rural and with limited technical capacity to design and deliver sustainable WSS, are increasingly active in identifying ways to confront the challenge. In an effort to help local governments become knowledgeable on current key issues needed to implement sustainable rural water and sanitation services, RAS_HON, Honduras' local water and sanitation network, and WSP-LAC have initiated the preparation of an operational guide for the design and implementation of rural water supply and sanitation services, from a municipal perspective. The objective of the operational guide is to strengthen the capacities of municipalities, local NGOs, and local water boards in the design, construction, and implementation of sustainable rural water supply and sanitation.

The guideline has being conceived to promote the following issues:

- The reorganization of the sector in Honduras, according to the recently approved WSS Law;
- The implementation of appropriate technologies for water disinfection and rural water pumping;
- Community contracting for the implementation of rural water and sanitation services;
- Demand driven approach evaluation indicators for implementing water services; and
- The promotion of hygiene and health education associated with the implementation of water and sanitation services.

Even though the guideline is in early draft, the preliminary results have been adopted by government agencies involved in the preparation of the Rural Infrastructure Project to be financed by the World Bank. The final version is expected to be finalized by October 2004.

Status of Capacity-building

With the hand-holding support extended by the support agencies, NGOs deployed for the purpose of building technical and managerial capacities, the VWS&SCs have been able to support the construction of water supply infrastructure in the villages. It was observed that requisite capacities for independent running of the water supply systems either from the social or from the administrative point of view are not yet adequately in-built; and these committees still need assistance from the Taluk or District offices. The process of levy and collection of water tariff, the procedures involved either in executing departmentally or outsourcing the annual maintenance, raising sufficient resources to meet maintenance costs, the skills of administration and superintendence of the water supply schemes etc., are yet to be mainstreamed in order to ensure sustainability of institutional governance of the VWS&SCs.

Chapter V

Field Data and Observations

The study team visited 36 habitations across seven selected districts in the state and made observations on various issues (itinerary is presented in Annexure 5.1) in relation to RWSS. Besides visiting the ground realities regarding project implementation, the team had extensive discussions with the ZP officials, TP Officials, GP officials, VWSC members and the community at habitation level. In addition to the observations and discussions by the study team, primary data/information has been collected through structured questionnaires to determine the perceptions of the community and VWSC members with regard to RWSS functioning. The analyzed results are presented below.

As the results are only from 34 habitations, they can at best be referred as **substantiated observations**, providing a wider perspective of the actual ground level situation. In view of these, the results have not been put to further statistical tests for drawing detailed statistical inferences.

5.1 Perception on Service Level

As per the primary survey across seven districts, about 37% of the households received more than 16 buckets (about 200 liters) of water in post monsoon periods, 46% received more than 150 liters of water and the rest 17% were able to get less than 120 liters per family in the period. However during summer (April - June) months, about 41% of household (with PSP) were able to get more than 150 liters per day, another 31% getting 120-150 liters per day and the balance 28% were receiving water less than 120 liters per day in summer months. The average water supply for 34 habitations was about 45 lpcd.

About 72% respondents felt that the supply was regular and within specified timings. However, the rest 28% were not happy with the regularity of water supply. The major reason of irregularity, as per respondents was non-punctual waterman (13%), irregular and erratic power supply (83%), occasional breakdowns and others (4%).

SI. No.	District	Water Supply in summer months#	Average water supply, lpcd*
		Liters per day per family	
1	Chikmaglur	160-432	47
2	Raichur	118-270	39
3	Gulbarga	130-305	35
4	Mysore	176-361	44
5	Dharwad	129-267	38
6	Kolar	106-210	29
7	Dakshin Kannada	185-840	82
	Average		45

Table J.I Delvice Level Acioss validus Habitations	Table 5.1	Service Level Across various Habitations
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range of average water supply per family for different habitations

* Assuming an average family size of 5.1.

5.2 Perceptions on Water Quality

During primary survey, perceptions on water quality were enquired from the respondent households. Overall, about 83% respondents confirmed that the quality was good, whereas, about 17% respondents indicated that the quality of water supplied was not good. It was indicated that the only technique used were either chlorination or only filtering. About 68% respondents felt that the chlorination was also occasional and not everyday (regular).

A further probe into the reasons of dissatisfaction indicated that out of 17% dissatisfied respondents, 39% were not satisfied with the taste of water, 23% with color and 38% with some other reasons (hardness, smell, iron and other contaminants etc.).

Regarding quality improvement measures, each scheme had provision for chlorination. However, in most of the schemes, proper storage of bleaching powder etc. could not be observed. At household level, simple filtering was the most commonly practiced method to improve water quality (physical impurities) besides sedimentation to a very limited extent. Boiling was the least practiced (about 1%) technique to improve water quality.

Except 3 VWSCs, no VWSC has provided samples for water quality analysis, after commissioning of the schemes. Although, under *Jal Nirmal* project, there is a provision of six monthly water quality testing, yet as most of the schemes were commissioned only recently, data for second testing were not available.

SI No	Water Quality Parameter	Response, %
	Quality of Water	
	Good	42
	Satisfactory	41
	Poor	17
	What is not good/bad	
	Smell	4
	Taste	39
	Color	23
	Others	34
	Quality Improvement Measures Adopted	
	At water Supply level	
	Chlorination	All
	Use of Chloroscope	Nil
	At Household level (for drinking)	
	Filtering	61
	Sedimentation	29
	Boiling	1

Table 5.2 Perceptions on Water Quality

Technology:

Technology for improvement of water quality has been discussed at various forums. However, the team could not observe any functioning unit (de-fluoridation unit, alumina technique) in any of the villages visited.

5.3 Water Supply Planning

5.3.1 Approach:

The preset approach of the GoK has been the demand responsive bottom up approach. However, in most cases, communities were not aware about the need for integration of their opinions into water scheme planning. About 73% respondents expressed that they were never consulted in planning of the water supply scheme. However, for water supply schemes in Kolar districts, the awareness was highest, where in one habitation indicating as high as 90% respondents participating in such planning exercises.

5.3.2 Demand assessment:

At the scheme level, the present approach of planning, integrates various demands at household level. However, our observations indicate that the household survey has an inherent limitation i.e. for demand assessment - it sums up various per capita water needs (drinking, washing, livestock, ablution, cooking etc. without providing any scope for alternate uses (waste of one for another use).

3. Component Sizes

While planning invariably the design population (20 years projected population) has been considered. Further, due to use of "standard" or "ready-made" designs, the overhead tank size was invariably observed to be very high even for design population. For ex. The water needs of the "projected population" were observed to be only a total of 32000 l, but the OHT chosen was of 50000 l capacity. Overall, more efforts are needed for "rightsizing" of OHTs. There is a need to use innovative techniques in design and sizing to optimize costs: Alternate schemes of water supply (two time or separate timings for separate groups) could have been evaluated and compared to have "rightsizing" of OHTs. Secondly, all components have been designed for the design population (20 years). However, there are important components (like pump etc.), whose life is less than the design period. There is no justification for selecting them for 20 years "design population" whereas these components would not be in use after their life cycle i.e. a maximum of 15 years. There is a serious need to integrate "project life cycle analysis of all upcoming water supply schemes with varying population (with time).

5.3.4 Assumptions

Review of some ESRs indicates that the assumptions made for economic analysis are questionable. In many cases the assumptions are "very much" different than "real" or actual field costs especially when the O&M costs are considered for civil works as well as for pumps and machinery. Regarding repair and maintenance costs, were observed to be in the range of 4.3 -11.1% in the initial years of the few schemes (detailed repair and maintenance data were not available in all the schemes). Whereas, the maximum provision is only of 5% in ESR. There is a need to compile the repair and maintenance costs data over a period and integrate them into the design to have realistic estimation of O&M costs.

5. Scheme Development

In a number of villages, new schemes with "new sources" were initiated (without proper analysis of reasons of failure of earlier scheme and its documentation) to meet the needs of water supply to the community. As per discussions, the major reason in most cases (97%) cases was "source failure" or "quality" issues. In view of these, there is an urgent need to document habitation wise the reasons and integrate possible solutions, while designing and implementing new schemes in such habitations.

5.4 Community

The team visited the both reform schemes (SRP, Swajaldhara and *Jal Nirmal*) districts as well a conventional schemes during the field visits and interacted with the community in selected GPs. The observations of the team on the participation of the community in the various project activities affecting government efforts on community participation, decentralization, empowerment, gender integration etc are discussed below:

5.4.1 Awareness Levels

The awareness levels about the reform process, programs etc. in the habitations was 43.6%, which is fairly good. This could be also due to the fact that about 34.6% respondents have attended at least one meeting regarding the project (SRP, *Swajaldhara, jal Nirmal*) activities. However, during field visits, it was observed that nearly all of the respondents understood that "reforms" as synonym with "capital cost sharing and 100% operation and maintenance costs to be borne by the community". The awareness was also visualized by the presence of people in the meetings during the visit of the Study Team and the openness of community in bringing forward various issues regarding RWSS.

5.4.2 Community Participation

In the habitations, people were well aware about the concept of community contributions and the 100% cost of operation and maintenance to be borne by the community. Although, the required capital contribution was made by the community towards the scheme (project), as an essential requirement, yet it was apparent that the total amount was contributed by a limited number of community members (mostly *Adhyaksha* and some other influential member of the community contributing substantially). About 46% respondents (in primary survey) did not make any capital cost contribution. In two habitations in *Dakshin Kannada* and *Mysore,* it was indicated that a large part of the community contribution was made by some local industry or by the industries, whose employees were staying in such habitations.

Interactions with respondents indicated that more than 60% respondents did nor have any ownership/interest in the projects because of lack of participation in most of the project activities.

5.4.3 Decision on Technology Options

Under reform activities, where capital cost sharing has been pursued, it was also made mandatory to present the "Technology Options" to the community before final selection. Under *Jal Nirmal* project, it is a compulsory process before finalization of the Detailed Project reports (DPR). However, this was seemingly interpreted quite differently in nearly all the habitations. The study team also accessed some DPR and the DPRs contained "Proposed Options" but "No Technology Options". Further, in most DPRs only two "Proposed Options" were provided. During filed visits, it was observed that none of the community members could understand and differentiate between the technology options and two options of the same technology. For them the two options were the "Technological Options".

Further, only 13% respondents confirmed their participation during the discussions on the options. Further, 76% respondents confirmed that it was VWSC, who took the decision on the proposed options.

4. **Community Contracting**

Only 14% respondents were aware about the community contracting process in the Jal Nirmal Project. In district Chikamaglur, none of the respondents knew about this as a

method. However all the VWSC members in *Jal Nirmal* project habitations knew about the community contracting concept.

5. **Gender Empowerment**

Interactions with womenfolk revealed lack of awareness, where the involvement of women was needed. Their participation in decision making required was reported to be insignificant. Even their involvement in VWSC was observed to be non-existent.

6. **Transparency at Local level**

During field visits, interactions with the residents revealed a lack of awareness on the process of decision making within VWSC. They were also not knowledgeable, if their inputs were needed by VWSC in making some decisions. Their participation in decision making was observed to be nearly negligible. Most of the respondents felt that VWSC is run by a group of influential persons without the knowledge of the large part of the community.

5.5 Operation of PWS/Mini Water Supply Schemes

1. Electricity Supply Hours:

The electricity for operation of these schemes was not available on regular basis. In a large number of cases, it has affected the design service levels. The primary data indicate that against the design pumping of eight hours about 77% schemes were pumping for only 5 to 6 hours. Further, about 75% schemes did not have fixed electric hours, thus leading to erratic power supply and thus irregular water supply timings.

2. **Profile of the Pump Operator and Waterman:**

The pump operator was the key to operation and maintenance of both the Mini Water supply Scheme and the pumped water supply schemes. The pump operator is generally appointed by VWSC/GP and most of the decisions regarding operation (number of hours, timing etc.) are taken by operator and the Chairman, VWSC. The results of the primary survey/filed observations by the study team leads to following observations:

- The salary of the pump operators ranged from Rs 700 to Rs 1500 per month.
- Their qualifications ranged from no formal education to first year of college or with industrial training.
- Most of the pump operators were having very limited tools (2-3 spanners, 1-2 screw driver, 1 electrical tester, 1 pliers etc.)
- Limited preventive maintenance (greasing etc.) was undertaken by all the pump operators.
- 94% pump operators had no formal training on operation and maintenance of the pump.
- The salary of waterman ranged from Rs 500 to Rs 900 per month.
- 43% waterman informed that they were cleaning the OHT/GLSR in 15-20 days, while the rest were cleaning it once a month.
- No operator/waterman had chloro-scope to measure chlorine content.

Overall, there was lack of technical competencies with the pump operators, mainly to carryout preventive maintenance.

5.5.3 Household Connections

All the schemes visited had provided both household connection as well as public stand posts. However, number of families served per PSP (under piped water supply) on an average varied between 18 to 44. Wherever, the families served per PSP were low, discussion revealed that due to high PSPs, families did not opt for household connections.

4. Maintenance of PWS

The primary responsibility of supervising the operation and maintenance lies with the VWSC/GP. However, in practice it is with the pump operator. Further, the pump operators were also not technically qualified/ trained to undertake such repairs. Similarly, there was no provision of any stand by pump. In most cases, repair facilities were also not available within a short distance. Therefore, any repair (medium, major) required a considerable time and costs. Due to poor training, there were no inventories of spares (except grease, gland, washers, nuts etc.) available with the operators.

5 **Clarity on Roles and Responsibilities**

There appeared to be a fair understanding on the roles and responsibilities for of the VWSC and GP regarding the RWS schemes. Although VWSC members were not fully aware about the detailed roles and responsibilities of VWSC, but all of them were very clear about their role in relation to community cost sharing, decision on water supply timings and duration, general maintenance, water tariff setting, bill collection etc. Similarly, more than 80% VWSCs knew about their role in making technological choices. However, more than 90% of VWSCs expressed their technical knowledge to make informed choices as a limitation.

6 Sanitation Situation as per Primary Survey

A primary survey was conducted in seven districts comprising 34 habitations. Structured questionnaire was used to assess the sanitation situation in these villages. The results of the survey as well as field observations are described below:

5.7.1 Coverage

Out of the houses surveyed, only 39% houses had latrines within their premises. Out of these latrines, about 64% were constructed under *Nirmal Gram Yojana* or TSC. About 13% latrines were constructed by individuals on their initiatives and without any incentives etc.

5.7.2 Reasons for Opting Individual Toilets

During primary survey, respondents were asked to the reasons of adoption (who were having HHL) and the reasons for non-adoption (who did not have HHL). The three most important reasons for adoption were need based and privacy (14%), subsidy (64%) and motivation and understanding of health issues (11%) besides other minor reasons.

Amongst the reasons for non-adoption, the three most important reasons were preference for open defecation (67%), poverty and/or no fund availability (22%), high water needs (4%), fear of smell in the house (3%).

5.7.3 Usage of HHLs

Amongst the 34 villages, latrines were used by all members (62%), by some members, especially female members (29%) and not used as toilet by any members (6%). The non-use by any members was on account of problem in pit, poor construction, back flow problem etc. In some instances, it was used as bathroom especially for female members or in about 2% cases as store room.

7 Personal Hygiene

5.8.1 Hand washing after defecation

Although, all respondents were washing hands after defecation, yet only 26% respondents were using soap and about 23% using mud. The remaining respondents were washing hands with plain water only.

5.8.2 Toilet Cleaning

The survey indicated that about 57% respondents were cleaning their toilets daily.

8 **IEC and HRD activities**

The IEC efforts were observed to be much more focused on health aspects rather than on details of reform principles, community contribution and roles and responsibilities of various actors. Under IEC, objectives of reform programs and roles of each institution and community were not stressed upon in IEC resulting in weak understanding of the reform program. However, a close correlation was observed in the focus of the IEC message and the background of the person delivering the message rather than emanating from a standard module for IEC. Further, none of the IEC activities had focus on Ground Water Protection Act and pollution aspects.

Chapter VI

FUTURE OUTLOOK

The key findings of the study present many challenges to the GoK in its objective of providing safe drinking water and sanitation to its entire rural populace. The daunting task of achieving fully covered (FC) status to all its 56,682 habitations with operational sustainability along with social equity and empowered community based management of water supply schemes makes the task of the government much more challenging. The state Government has been entrusted the task of **evolving** a rural drinking water and sanitation vision and a strategy for achieving the vision. The achievement of such objectives need to address following issues and should provide practical solutions to the **key areas** as discussed below:

1 Planning

- The water supply schemes are designed to meet local water needs. However, a typical water supply scheme is affected by major water uses in the "area". Therefore, there is an urgent and serious need for a comprehensive and integrated water use plan for the "area". While defining the "area", the major issue is whether the planning "area" should be a village, a GP, a district or an aquifer. Since water does not follow any administrative man-made boundaries, the aquifer based planning can be used to meet the challenges of rural water supply schemes. This implies that an integrated "aquifer" based water use plan should be developed based on water availability, potential water uses, recharge potential etc. in the "area". Based on field observation on implementation of GW protection Act (protection of drinking water sources), which is meant to safeguard and prioritize drinking water sources, such a planning process has been suggested. As a first step, this may require identification and delineation of both deeper aquifers as well as static aquifers at much lesser depths. Further, the suggested planning process is not simple and may require changes in the cropping pattern, industrial uses/development, other uses in the "area" etc. and thus shall require some serious government acceptance and interventions beyond KRWSSA/RDPR. The planning, in the long run, must be extended to include water quality aspects besides the present emphasis on quantity perspective. Overall, adoption of a quality and quantity based integrated planning practice can only ensure safe drinking water to rural population of Karnataka.
- At the scheme level, the present approach of planning, integrates various demands and is said to be a bottom up approach. However, our observations indicate that the household survey has an inherent limitation i.e. for demand assessment, it sums up various per capita water needs (drinking, washing, livestock, ablution, cooking etc.). In view of the dwindling water sources it is very necessary to carryout proper demand survey for assessment of "actual" water needs. The survey should assess present uses, future uses and potential of water conservation and management at household/local level. This inter-alia means management of "used water" for other applications i.e. Can the water after washing of utensils and bathroom wastewater could be used for washing cattle sheds, kitchen gardening etc. Such an assessment would not only encourage water conservation and management but would highlight actual needs rather than "summed" up needs. Further, the imposition (or following up) of RGNDWM guidelines, limit the scope of the demand assessment. It is suggested that a "revised" demand assessment need to be included to make the schemes truly "demand driven as well as need responsive".
- At ZP level, under the prioritization practice, the concept of demand responsiveness
 has been correlated to the capacity of GPs to contribute in capital cost. This was

considered as a pre-qualification for making applications for WS schemes. Field observations indicate that this causes difficulties in prioritization based on actual needs and is likely to deviate the process from the principle of social equity.

- **Present process of preparing** village level drainage plan should be expanded to integrate it with GW recharge measures. The drainage plan could include design of porous or open jointed/slab drains, or trapezoidal drains using local rubble besides other conventional GW recharge measures at the lower end. This integration is presently being practiced under *Jal Nirmal* project but needs to be expanded.
- Overall, the water supply, GW recharge, water management at local level besides sanitation, and hygiene education are to be essentially integrated for better results. This need to be converged with capacity-building strategies and other state supported initiatives etc. in the sector. At the State level, drinking water is with the Rural Development and Panchayat raj Department and Irrigation and Water management is with the Ministry of Water Resources. The SWSM, though constituted has very little mandate, lacks a budget head, and does not have the necessary manpower. At the district level, there is the DWSM, with the Chairmanship of the CEO and the DSHM under the Chairmanship of the ZP President. The mission lacks functional co-ordination and convergence. At the GP level, the GoK has issued detailed guidelines for ensuring effective planning and implementation. In spite of the efforts made, integration still has a long way to go, as departments continue to be watertight compartments. The State, despite being a pioneer in decentralization, runs parallel departments and for achieving effective departmental integration within the respective *de jure* powers, a lot yet has to be done.

Field Observations

- In many habitations, the piped water supply schemes were taken up only because of the funds availability and political considerations. It is not at all demand driven. Evidently, the poor and the vulnerable groups are not being benefited in several localities. Similarly, the costing of the scheme and service level etc. has not been linked to affordability, demand, norms and social management capacity of the community.
- In many instances, the designs of the schemes were not planned based on the capacity and capability of community and their willingness to contribute to the capital cost sharing and full O & M costs. The size of OHT and other components were observed to be on the normal standard/traditional engineering prototype designs. There is plenty of scope for "rightsizing" the design of OHT and other components thus reducing both capital costs as well as O&M costs. Typical villages had design requirement in 2021 as 40,000 litres per day (present demand is in the range of 30,000 litres) but with an OHT of 50,000 litres. The major reason for opting 50000 liters OHT, is erratic power supply and non-availability of standard design of 40,000 litres. The present untrained pump operators, make the OHT full (50,000 litres. This is encouraging misuse of water, leaking/free flowing tapes in the village, higher water tariffs to the community as well as stress on future groundwater availability.

6.2 Type of Water Supply Schemes

At present about 95-96% schemes are ground water dependent and the rest are dependent on surface water. However, with increase in water quality problems and

declining source sustainability of ground water sources, a "rethinking" on the use of treated surface water needs to be done. Since the northern districts (ex. Raichur, Gubarga etc.) are comparatively dry (low rainfall) and have problems of source sustainability, perennial rivers/tributaries could be analyzed and exploited as the source of drinking water.

With increased emphasis on surface water and quality problems in ground water, multi village schemes and dual water supply systems need to be assessed and planned for implementation. There is a strong need to formulate and experiment with certain guidelines.

Water metering needs to be advocated to promote conservation and charge as per use. However, this requires additional cost to the user as well as recurring cost of upkeep and maintenance. Therefore, while implementing such strategies due consideration must be provided to social justice and equity (some support to BPL families in installation of meters for household needs to be considered).

Quality marked equipment must only be used in water supply schemes (pumps, pipes and fittings, electrical systems, cement, steel, household fittings, meters etc.)

Overall, when schemes/programs are implemented by agencies that does so without stake in the cost of capital, the tendency would be to boost up investments through over-design. The design norms are not an end in itself. There is little reason to design a system for 20 years, which may only last for few years. The trade-off could be analyzed and decision taken accordingly. Secondly, there is immediate need for standardization and quality assurance (according to specifications) of low-cost and alternate technologies. Thirdly, public investments may avoid designing for higher service levels (above life line service), unless there is provision for capital cost recovery. One argument often raised in favor of higher end design is that surface water based large systems may not be amenable for augmentation as and when demand increases on account of the lumpiness of investment. Here, caution may be exercised to analyze the cost of capital and net present value (NPV) of investments and also the fact that a majority of the schemes even after the expiry of their life span has not achieved the designed service level.

3 Coverage and Service Levels

As log books were not found to be maintained at local level, there are no adequate records of supply levels during various periods. Therefore, the assessment of service levels at local level cannot be done in a scientific manner. It raises the issue of "factual" data on service levels and raises concerns on the present levels of service. Field observations indicate that most of the reported "service levels" are those, which were initially designed based on yield data at the time of commissioning. There are no systems in place to re-authenticate the yield data. Non maintenance of log book records only results in inaccurate data, which also has serious planning implications. Therefore, it is very essential to have a mechanism in place to have proper records and service levels at scheme level.

Further, on account of very high-unaccounted flow, the effective service levels are severely limited under supply-driven delivery. There is an urgent need to maintain records of both water generation (pumped) and supplied (service levels) to assess such unaccounted flows.

6.4 Source Sustainability and GW recharge

There is a strong need to have updated data on efficacy of GW recharge measures and their applicability. There is need to provide further incentives to such measures especially rain water harvesting for recharge and also to the collection and storage of rainwater for meeting drinking water needs.

Field observations indicate the need for enhancement of retention time for recharge measures. Therefore design of rainwater retention structures need to be further enhanced to increase retention time for infiltration/percolation.

Similarly, selection of recharge structures should be based on local topography, type of sub strata (geological formation), rainfall, basal flows etc. For ex. in areas along the rivers like Kagina (tributary of Bhima), Vardha, Balprabha, Netravati etc., the use of sub-surface dykes for macro level ground water recharge could be practiced.

Field Observations

In a number of villages, minor irrigation tanks were existing, but not used for irrigation. Similarly, there are a number of village ponds available. Due to silting, the water storage capacity of most of these structures have reduced and more often they have become flat in nature and therefore the stored water gets evaporated much faster. These ponds could be scientifically analyzed (location, geology) for recharge considerations and could be used after de-silting and or in combination with other measures.

The efficacy of various recharge measures on GW recharge was not measured and documented. In many instances, even the location of recharge measures and retention time provided for GW recharge were not scientifically assessed and implemented.

5 Water quality – Issues, Rectification strategies

With increasing ground water exploitation and pollution from both point and non-point sources of pollution, the quality of both surface water and groundwater is on decline.

There is an urgent need for a total water quality management system. This requires (used scientific identification of "test" wells for drinkina water). strengthening/establishment of water quality laboratories with requisite staff, facilities and procedures, a networked water quality data/information management system etc. This must be combined with CGWB and Department of Mines and Geology data base on water quantity. The collected data must be networked and shared for making decisions on type of water supply schemes, rectification strategies etc. Under Jal Nirmal project, there is provision of identification and strengthening of water quality laboratory in the 11 districts (implementing the Jal Nirmal Project), however the progress in two districts visited by the field team indicate shortcomings (recruitment of qualified staff etc.) in their actual functioning.

Involvement of local community in water quality management is considered very useful. They should be trained to identify physical quality problems and inform the district level officials (geo-hydrologist) about any observed quality problem for its further identification and to initiate required measures for rectification.

Field Observations:

• At most of the locations, water quality analysis is short of expectations. At a number of locations, laboratories were either not well equipped or were non-functional due to lack

of staff, equipment etc. There is an urgent need to "identify" and strengthen such water quality test labs in each district, where water samples could be tested. The test reports should be available to public. In absence of the tests, the community is still considering the quality at par with the water quality test results achieved at the time of source identification. Further, standard guidelines elaborating the frequency, type of tests, sampling techniques and approved list of laboratories in various district/locations may be communicated by ZP/State agencies to the GPs/VWSCs.

• During the field visits, no functioning unit for water quality improvement (like defluoridation units etc.) could be observed in the villages. It indicates the need of dissemination and/or improvement of technology for water quality needs.

6.6 Community Participation and Gender Empowerment

The participation and contribution of community is very essential in effective delivery of RWS services. During planning the community should be made aware of the need for water conservation, management and effective use besides informing them of any quality issues associated with the area. The well informed community shall support better assessment of "actual" water needs of family (service delivery levels), technological choices (quite often, the community was provided with little choices – one or two possible options) and in effective operational sustainability of the scheme.

As women are the main users of water, there is a strong need to integrate their perceptions on the water needs, availability, supply timings etc. Their services could also be used in planning (for identification of location of PSPs within a locality), for deciding timings of water supply, supervising PSPs (to check water leakages), in bill collection etc. This could also be supported by their effective participation in VWSCs etc.

Hygiene education and training is usually only geared to women. While both men and women have the need for and use sanitation facilities, their cleaning and maintenance is always delegated to women and girls. Gender roles, responsibilities and needs, related to sanitation and hygiene need to be distinguished to assess the implications for the types and ways of interventions.

Lack of sanitation facilities or inappropriate sanitary systems have a greater negative impact on women and girls than men and boys. So any sanitation project would need to consider the interests of women seriously. There is need for gender-sensitive choices and design of water and sanitation technologies. Normally, the decisions are taken by male technicians or by consulting the men in the family or community. The design flaws are the result of inadequate thinking, planning and consultation with the end-users. They need to be involved in decision-making processes concerning service level, type of system, design and construction, and they need to have equal access to all the opportunities that funded sanitation projects bring. So women should be consulted right from the beginning of any programme on water supply and sanitation services

Integrating gender concerns in water decision-making is important not only for greater equity but for greater efficiency and sustainability as well. Women are the worst affected in the event of inaccessibility to WATSAN services. Mainstreaming gender issues in WATSAN planning would (a) empower women; (b) reduce poverty; (c) improve education of girl child; (d) reduced drudgery and time saving (e) improved dignity and privacy; (f) introduce innovative approaches to financing the sector through SHGs, etc. *Inter alia*, the involvement could be through (i) decision making; (ii) designing; (iii) management; (iv) operation and maintenance; (v) finance; and (vi) institutional sustainability. In *Kerala* there are demonstrated evidences of slowly but steadily developing women networks SHG-PRI-CBOs-NGOs in water resource management, which require further strengthening. Similar evidences are available from *Churu* and *Hanumangarh* districts of Rajasthan.

Field observations:

- During pre-planning and planning phase (under sector reform), social mobilization was done to involve community into the process. The positive impact was that community became aware and interested in such initiatives (RWSS).
- There was no or very little feedback from women in making decisions on both water supply and sanitation plans, technology selection or in operational management.
- As per observations of the community, the present level of incentive for individual toilet construction is low and thus is not a motivating factor.

6.7 Operational Sustainability

The operational sustainability in its overall sense must include technical, financial, institutional, social and environmental sustainability. The technical sustainability encompasses both source sustainability as well as supply and delivery mechanisms. Financial sustainability in its stricter sense requires that schemes are able to meet the operational expenses (revenues are more than expenditures) as well as replacement costs. Social sustainability refers to provision of satisfactory level of services to all social classes based on the principle of equity, affordability etc. The institutional sustainability refers to mechanism with clear role and responsibility definition, supporting the operation of the schemes. Further, the environmental sustainability refers to integration of the RWS schemes in the natural systems with overall positive environmental impacts and their sustenance. This could be for integrated environmental management, natural resource management etc.

It is to be understood that the water supply projects are planned for a design population for next 20 years in most cases. However, the amount of water supply at present is more or less equal to the design supply (based on discussions with more than 27 pump operators) i.e full tank capacity of overhead tank and therefore, the overall cost of operation and maintenance is high. This is compounded by the fact that the rates of electrical tariff for RWS are also quite high (Rs 3.10 per unit +taxes), which is about 60-70% of the total O&M costs. On the revenue generation, number of household connections and public stand posts are much less than the designed numbers and therefore even at specified (detailed scheme reports) rates or GoK specified minimum rates, the (expected) revenue is much less. Further, the revenue collection is not 100%. Overall, in most schemes, the operation and maintenance expenses are much higher than the revenue, even in their early years of their operation and community is not able to afford these tariffs. This demands a re-look at the supply levels, operation, water tariffs, revenue collection and on the policy of 100% O&M costs to be borne by the community besides electrical tariffs.

The full O&M recovery policy is negatively affecting the scarcity hit villages (with low rainfalls and low water table), where the water is to be pumped from greater depths, thus increasing the cost of O&M. Further the agricultural dependent communities in such scarce areas have low affordability. This is against social justice at the state

level and requires re-look at the O&M policy. One of the possible solutions could include partial support to low water table (high O&M cost) areas or support to BPL families.

Field Observations:

- There are large variations in number of pump operators, valve operators etc. and in their monthly remunerations. It was quite heterogeneous in nature and no specific conclusions from the management perspective could be derived. There is an urgent need for capacity building of VWSCs as well as some guidelines o their employment and remuneration rates to streamline the issue. In some cases, it was pointed out that the decisions on number of operators as well as their remuneration rates were arbitrary. This has serious implications on O&M cost borne by the community.
- Community is not fully equipped or capacitated to estimate O&M costs. At a number of locations, GP is still paying "electricity" costs and local community has a very poor estimate of such expenditures, making O&M estimates quite different than actual. This nonpayment of electricity charges was observed to be both an "additional cost" issue as well as an "attitudinal" issue. Further, in a number of cases, as community doesn't have a fair idea of O&M expenses, it is charging a GoK suggested minimum water tariff rate of Rs 25 for HH and Rs 10 for PSP served families.
- Review of some DSRs indicates that the assumptions used for economic analysis are questionable. In general, assumptions were observed to be much different than actual field observations especially on repairs and maintenance costs etc.
- Most of the RWS schemes are in their initial (1-2) years of operation with low repair and maintenance expenses. These are likely to increase with the life of the scheme. However, community has not been informed about such variations. Further, in most cases, the community is considering present O&M tariff a bit on higher side. How the community would react, when they would be asked to pay more in very near future.
- One of the major reasons for poor cost recovery is tariff regime, the revision of which would apparently be a difficult political proposition. Reform will take care of these issues at a stroke, leaving the cost recovery for the communities/user groups. The fact that the same political coalition was elected after the introduction of reforms in the GPs of KRWSSA and strong support for the PRIs in the sector reform districts. People are in fact willing to pay for better and reliable service levels, simply because of the reason that they end up by paying more under poor supply provision, in terms of money and welfare.
- Evidences suggest that for ownership, sustainability, cost reduction, and effective management, resources shall have to be managed at the lowest appropriate level. There are strong evidences to this effect in the State and elsewhere.

6.8 Integrated Water Resource Management (IWRM)

Integrated Water Resource Management Policy

The major issue in IWRM is the "area" for which a comprehensive and integrated planning is done. Whether, the planning unit should be a village, a GP, a district or an aquifer. It is perceived that aquifer based planning could be ale to provide an answer in meeting the rural water needs.

The effective answer to the fresh (drinking) water crisis is to integrate conservation and development activities i.e. from water extraction to water management at various levels (community, village, *taluk*, district). Making communities aware and involving them fully is, therefore, critical for success of such initiatives. All this will ultimately pave the way for combining conservation of the environment while meeting the basic needs of people. Although Water Policy 2002 lays down the major issues and guidelines towards IWRM, but considering the progress so far (as per action taken report), a review of the actions/policy decisions is needed from GoK.

There is a need for effective institutional mechanism and information management to pursue IWRM. Both these issue have been described under respective sections.

6.9 Improved Water Management at Local level

Considering the inappropriate use of water combined with other field observations on water supply schemes, there is an urgent need to make public aware of the improved water management at local level. This could include the following:

- Water **reuse** at household level: How the waste water of one application could be used for other household application needs to be discussed and implemented. This would reduce "effective demand" for water.
- Use of other local resources for alternate uses depending on the type of use: for ex. a source may not be safe for drinking but could be safe for washing clothes, utensils and bathing. These must be exploited appropriately.
- Water distribution management at village level
 - Equity in water distribution management mainly for tail end population : Effective valve controls and their management
 - Assessment and management of un-accounted flow. This would emphasize mainly on the leakage control in supply and distribution lines
 - Prevention of wastage of water at Public Stand Posts (push cock taps) as well as in households (compulsory provision of tapes)
 - Optimization of PSPs and HH connections: Field observations indicate that there are more number of public stand posts than the desired/required. This has resulted in low number of household connections and thus has resulted in lower revenues. Provision of low number of PSPs especially in affluent localities would encourage people to have household connections. The PSPs can be more justified in underprivileged/ vulnerable groups of the society. However, their numbers and locations need review.
- Recharge measures: Each house or a group of houses as well as outlets of public stand posts should have a recharge structure i.e. a scientifically designed soak pit for recharging the waste water into the ground and for environmental improvement. Wherever possible (especially in quality affected villages), rainwater harvesting should be encouraged and made compulsory for al existing and upcoming schools, public buildings etc. The government support (subsidy) could be linked to efficacy of structures.
- As a part of village level drainage and GW recharge plan, scientifically designed (considering absorptive capacity of local sub strata etc.) sub surface disposal trenches may be encouraged especially at the tail end of the surface drains,

6.10 Institutional and Organizational Development

At the State level, drinking water is with the Rural Development and Panchayat raj Department and Irrigation and Water management is with the Ministry of Water Resources. The SWSM, though constituted has very little mandate, lacks a budget head, and does not have the necessary manpower. At the district level, there is the DWSM, with the Chairmanship of the CEO, ZP and the DSHM under the Chairmanship of the ZP President. The mission lacks any serious functional co-ordination and convergence. At the GP level, the GoK has issued detailed guidelines for ensuring effective planning and implementation. In spite of the efforts made, integration still has a long way to go, as departments continue to be watertight compartments. The State, despite being a pioneer in decentralization, runs parallel departments and for achieving effective departmental integration within the respective *de jure* powers, a lot yet has to be done.

The KRWSSA, **nodal** agency for RWSS activities in the state, needs better role definition on project management, project facilitation and project monitoring. After that the agency requires to be strengthened accordingly. The positioning of KRWSSA and its leadership appear to be one of the critical factors in the success of the entire reform initiatives. This is based on the premise that such programs need to be driven in a mission mode by the responsible persons at the helm of the affairs, who believes in the philosophy of the program and wish to implement the program with enthusiasm and zeal.

The PRED needed to be equipped for and assured its effective role in the reform initiatives. It is essential in the sense that only with the spread of the philosophy of reforms reaching other support organizations, the success of the reforms could be ensured.

There is an urgent need to examine the role of DSU (District Support Units) regarding their mandate, role (especially with reference to social issues), positioning, staffing support and other features.

PRIs in the state need to be strengthened mainly in their staff and its capabilities. With increase in responsibilities at the GP level, there is an urgent need to build the capacity of the GP secretary as well as need for additional support staff. Funding for such additional staff and capacity building needs to be carefully analyzed.

VWSCs need to be more representative of the community. It might require review of PRI act and model bye laws of the PRI functioning, effective IEC and capacity building initiatives etc. These need to be addressed on priority. Field Observations on the Functioning of VWSCs

- Nearly at all locations (under sector reform) VWSC have been formed. However, at few locations, the representation of various groups was not as per laid guidelines. These committees at most locations have undergone major change as a result of "recent elections". However, VWSCs were still under formation in villages, where sector reforms were not undertaken.
- Most of these committees were only partially functional (have conducted only one meeting in last six months or so) and few limitations were observed in their "recording of proceedings", mainly due to engagement/capacity of the GP Secretary.
- Most of VWSCs are maintaining separate consolidated accounts but no separate O&M accounts.

- The co-terminus clause of Panchayati Raj Act, (stating that VWSC cease to exist with the elections at GP level and needs to be reconstituted) is causing difficulties in their sustainable operation at a number of locations. In most places, with change in GP office bearers (President, Vice President etc.) totally new VWSCs have come into existence affecting the RWSS functions. The issue regarding sustainability of VWSC functioning needs to be addressed.
- In most cases, health and sanitation as a function of VWSSC, was not highlighted by the VWSCs.

6.11 Project Management

The whole process of providing safe drinking water rests in timely execution of designed schemes. This requires making a long term strategy and plan for converting 56,882 habitations fully covered. Which entails assessment of - present status of various schemes, surface and ground water sources available for drinking water, water quality, fund requirements and possible allocations (time wise) for both maintenance of schemes and for new schemes etc. The strategy need to consider even phasing of various schemes for conversion of PC to FC habitations, while maintaining he FC status of various habitations.

At delivery level, it is very essential to have social aspects integrated into the scheme. GoK/KRWSSA has employed engagement of NGO, Support Agencies (under Jal Nirmal) etc. for the purpose. The experience indicates that engagement of SA is costly as well as time consuming and GoK/KRWSSA still need to monitor them extensively. However, considering the expertise available within RDPR, KRWSSA on engineering and hydro-geological aspects, it may be worthwhile to use their services for source identification and engineering designs. However, certain aspects like engineering (total station survey) survey etc. could be outsourced at local level (as these may require costly equipment and specialized manpower). Similarly, household survey for demand (should be "need") analysis and community participation could also be outsourced through NGOs, as limited manpower is available within ZP/KRWSSA. These issues raises an issue of institutional sustainability but with a wide network of NGOs, survey firms within the state as well as "occasional" needs and "costs" of such activities, the financial considerations should be considered actively.

One of the important features of past experience (under WB project) is community contracting. However, field observations raise few questions on such process;

- Does a community contracted project is "really" implemented by the community?
- Does it help in improving the capability of local community?
- Who makes the capital cost contribution (community contribution)? It is really made by the community or by a prospective contractor, who could be the final beneficiary of the community contracting process?
- Is the community capable (both technically as well as practically) to monitor the quality of services and materials under the said process (contractor)? ...

From our observations, it emerged that before community contracting could be practiced, capacity building of community is a must. The capacity building is specifically important, where skilled jobs (like construction of OHTs) are to be carried out. However, for semi-skilled needs (like drainage works, small road construction etc.), community could be very much involved. Overall, the present system seems to not to meet its desired objectives and a serious rethinking is required to improve the present system.

Field Observations:

Community contracting has been practiced in some cases towards community involvement, without considering the capability and management capacity of the community. Otherwise, it is once again local contractors, who work as sub-contractor to the community (mostly for the full work) and reap the benefits, which were supposed to be shared by the community.

The good project management practices are too often not followed. In few instances i.e. even sequencing of activities was not proper. In some cases, as reported, masons were trained in construction works for RWSS works (especially OHTs), much ahead of their scheduled needs. Most of them were later not available (migrated), when the actual needs were felt.

6.12 Legal

Under the 73rd and 74th amendment of the Constitution, water and sanitation is the mandatory responsibility of the PRIs. Empowering them in discharging their mandate is a Constitutional obligation on the part of the State.

In order to facilitate VWSCs to stand to the test of legal scrutiny, GoK, instead of issuing office orders, circulars from time to time, may bring an enactment duly passed by the State Legislature prescribing procedure of formation and functioning of the Village Water and Sanitation Committee as contemplated under Section 61-A Sub Section (3) of the KPR Act 1993 (as amended).

The implementation of the GW Act needs to be streamlined within the PRI system. Further, officials of ZP (geo-hydrologists etc.) need to be made sensitive to the issue and should be capacitated to act pro-actively. The present limitations in the implementation of the act need to be addressed.

Administrative governance regarding maintenance of records, log books etc. need to be encouraged at local level and such information should be shared to assess water misuse etc. Further a system of authentication/verification of electrical bills etc. with pump log book etc. needs to be put in place and the VWSC/community trained for the purpose. In case of discrepancies, procedures may be laid for bringing the matter to the notice of higher authorities of PRIs, to tackle the same with KPTCL.

There is a strong need for an effective regulatory framework, particularly in the areas of competing uses, inter-generational equity, tariff, pollution and water quality, private public partnership, de-sheltering water markets, equity issues, encouraging healthy competition, etc. The ownership of ground water is associated with property rights. When there are multiple providers addressing communities on user cost recover principles, the role of the regulator to ensure level playing field is very critical in conflict resolution on water sharing. The ground water legislation passed by the GoK is a move in the right direction, but needs to be supplemented by follow up action. In order to achieve better results, adequate incentives and disincentives needs to be built up, say for e.g., compensatory recharge for getting clearances for ground water extraction, application of polluter pay principle, wherever compensatory recharge is not possible, the GP could levy a charge equivalent to the
depletion premium and supplement the funds in community-based aquifer management.

Clear and enforceable water entitlement at all levels is a prime pre- requisite. A formal system of water rights is to be evolved. Water entitlement is usufructuary. It is a right to use, not a right to own as ownership of water resides with the State. Water entitlements of individuals and communities should be separated from land rights and they should enjoy the same legal certainty as land and other property rights. However conferring a right induces a strong demand from users for better measurement, transparency, regulation and information. Those who have entitlements become powerful forces for ensuring that the resources are managed in a sustainable manner.

State Water Policy 2002 admits the fact that the responsibilities of water issues are fragmented between different departments without formal mechanism to ensure coordination. For multi sectoral water planning, inter sectoral water allocation, planning of water development programs, management decisions and resolution of water resources issues, a State Water Resources Board was contemplated to be established and the present Water Resources Development Organization was to act as Technical Secretariat for the State Water Resources Board.

Hence, creation and management of a water entitlement system establishing individual and transferable water entitlements' long term strategy, adopting a pragmatic intermediate strategy of establishing bulk water entitlements for entities such as Water Users Organizations, Urban and Rural Water Supply Agencies, Industries etc., by enacting legislation with adaptations from acts like Maharashtra Water Resources Regulatory Authority Act 2005, is the need of the time.

Field Observations

• The level of knowledge about GW act was quite low at community level and even some officials at PRI level were not fully conversant with it. There is a strong need to create public awareness on this issue.

6.13 Information Management

Scientific information on sector status, sector institutions, resources and their performance is not collected, compiled, analyzed and presented in a systematic manner, though isolated efforts have been made by various sector institutions. Developing and managing sector information, access to comparative information and best practices within the State and elsewhere are essential for policy makers, donor/lending agencies, practitioners and providers/suppliers (private/public) for quality improvements. As part of the Jal Nirmal programme, piloting of Sector Information Management System (SIMS) is being attempted. An information management system is in place at KRWSSA to monitor the progress of various schemes. A number of GPs have already been equipped with computers etc. for information management. For improved information management and monitoring of various schemes at GP level, KRWSSA under Jal Nirmal project is providing computers, equipment and training etc. under the GP Strengthening component. However, an effective system of data collection and management needs to be developed. One of the important data/information, which needs to be shared, is about the physical and financial sustainability of various rural water supply schemes. This inter-alia should have log records of pumps, electricity, water supplied, O&M costs, water quality test reports etc. Monthly statement regarding O&M expenses, demand

generated, revenue collected etc. need to be developed to asses financial sustainability.

There is urgent need to consolidate the efforts already made.

The current system of monitoring and evaluation is apparently weak, in terms of design, indicators, and collection of data. Most of the data collected are scattered, vertically flowing upwards without any reverse or horizontal flow. In case of water and sanitation, the monitoring data is seldom transferred to the grassroots level at least at the GP level, to facilitate debating, discussing, and decision making by the people. The system lack co-ordination and synthesis at the top and usually ends up as part of the records of respective departments.

Similarly, data/information collected and actions initiated by concerned departments/organizations i.e WRDO, CGWB, DMG, Watershed, Drought Monitoring etc. needs to be shared. This would support making informed decisions on various schemes. Overall, a improved system of networked information is needed.

6.14 Sustained Capacity Building

The State need effective communication strategies addressed at all levels: the policy makers, administrators, implementers, researchers and users to enable them to make informed choices and decisions on visioning, planning, water conservation, recharge, production, distribution, asset management and social responsibility and accountability. Several departments or institutions are spending on awareness, IEC, and behavioural communication. However, there could be a sectoral communication strategy and key messages, professionally researched and designed and disseminated. The current approach of judging IEC from financial targets is to be shifted to result-oriented social marketing approaches.

Severe dearth has been acknowledged for capabilities and skills to take up the water management challenges of the new millennium. Major institutions in the sector are technically oriented, sectoral and centralized, seriously lacking capabilities to alter social systems to promote efficient water use. Urgent attention is required to build the required capabilities and to re-orient the existing manpower. Many of these capacity building institutions lack capacities including infrastructure, manpower, professionalism, and accountability. Almost every department has a human resource/training division, but are weak in assessing capacity building needs in the context of their institutional objectives. The time has come for a fundamental re-examination of the objectives and performances of the institutions, vis-à-vis their changing roles.

Though the scientific and research institutions are coming out with serious issues of water sector sustainability, they fail to sell their findings to policy makers and political leadership convincingly. Consequently, the opportunities created to improve living conditions, quality and service levels and user satisfaction are then lost. One of the key requirements in the sector is the design of effective advocacy and communication strategy, supported by scientific analysis of data.

Overall, there is an urgent need of capacity building at various levels: from high level policy makers to grass root level communities. Considering the changes in VWSC electorate, GP representatives etc. there is a need to undertake capacity building in a

sustained manner. Therefore, it should include capacity building (knowledge, attitude, skill building) at various levels, which includes the following:

- Building positive attitude and knowledge of Policy makers on
- vision development, planning, budgeting, sustainability and environmental impact assessment, institutional restructuring, technical analysis and technology developments, regulatory approach, water rights, conflict resolution, gender integration etc.

Developing skills and knowledge base of officials of PRIs on

- technological options, water quality issues including monitoring, sanitation and hygiene issues;
- technical and managerial issues, tariff fixation, O&M,
- conflict resolution

State/District level functionaries on

• social mobilization, public awareness building, water quality monitoring, sanitation and hygiene etc.;

GP secretary on

- account keeping, record keeping, information management
- Computerization
- Maintaining records, proceedings etc.

Local elected representatives on

• technological options in RWSS, legal acts related to PRI institutions;

VWSC representatives on

- Water distribution management,
- O&M management
- Authentication of electrical bills with records, log books etc.
- Social equity and gender integration
- Health and hygiene
- Water and sanitation mapping

Pump Operator/waterman on

- Maintenance of log book records (operation, repairs etc.)
- Basic trouble shooting of pumps and fittings, basic electrical repairs etc.
- Maintenance (including minor repair) of water meters

Rural community/public on

- Public awareness on reuse of water and improved water management at household level, GW act, local recharge measures, sanitation and hygiene, water quality monitoring, water conservation, environmental sanitation, operational and financial sustainability of water supply schemes and use of alternate sources based on type of need etc.
- Upkeep of water meters, household taps etc.

Field Observations:

• Capacity of VWSSC to fix water tariff and calculate O&M expenses was highly limiting. Their capacity needs to be further built (some brief trainings have been provided but further steps are needed).

- There is a need to develop capacity of pump operators and watermen (valve operators) to have effective and "equitable" water distribution at local level.
- With decentralization and devolution of powers at local level (GP), the capacity and capability of the GP secretary (single incumbent) needs further review. There is an urgent need for training/capacity building of GP secretary and even to provide additional manpower support depending on the size of GP etc.

6.15 Financial Strategies and PPP for RDWS Systems

- The ABC analysis indicates huge resource requirements (exceeding 2000 crores) for making the state fully covered as per RGNDWM guidelines. The requirement would keep on increasing with time. Therefore, there is an urgent need to mobilize the resources for the sector. Since the new schemes have transferred O&M component on the community, the capital cost remains a major issue in developing such RWS schemes.
- It has become increasingly clear that (i) the State may not have sufficient financial leverage to improve the existing service level and (ii) to achieve full coverage under the existing scenario. Reform could enable the GoK to use the available resources as leverage funds to harness more resources from (a) Gol, (b) donors and bilateral agencies, (c) households/communities, and (d) private sector. Critically it would be prudent to utilize State's resources to leverage maximum impact and to act as a ladder for growth rather than to cap the initiatives of the key stakeholders. The assets created under the RWSS will be the intangible benefits, which will act as catalysts and tools for community and social development in the coming years.
- It has been observed that the state has a strong industrial base and in many instances, employees for these industries belong to neighbouring villages. Therefore, industries may be involved in develop/support government interventions on RWS in such localities. The community contributions (as required under SRP, Jal Nirmal etc.) could be provided by local industries as part of employee welfare measures (RGNDWM guidelines need further review). This is based on the observations that "community contributions" under present system has been considered as the major indicator of "community participation". However, safeguards must be taken to not to provide any undue advantages to the "industry".
- Considering the low level of technical knowledge at community/VWSC level and need of repair and maintenance of some complicated parts (submersible pump etc.), outsourcing of such repairs at TP level or by a group of 8-10 schemes may be practiced. The outsourcing on the lines of annual maintenance contracts (AMC) would reduce administrative hassles and breakdown time, while keeping the costs with permissible limits.

6.16 Health, Sanitation and Hygiene

Effective institutional mechanism and systems need to be developed to collect and compile the incidence of disease occurring due to unsafe drinking water and its health impacts. A strong reporting and coordination mechanism between water quality surveillance and monitoring units at ZP level and District Health Officer is needed to monitor such activities. This should also ensure better remedial measures.

6.17 Documentation

There is a strong need for documentation of various experiences in the state: be it sector reforms, planning, design, efficacy of delivery mechanisms, community

participation, recharge initiatives etc. KRWSSA is engaged in broad based documentation but specific case studies etc. could be documented for further experimentation and learning.

Field observations:

In a number of villages, new schemes with "new sources" were initiated (without proper analysis of reasons of failure of earlier scheme and its documentation) to meet the needs of water supply to the community. As informed, the major reason in most cases was "source failure" or lack of "source sustainability". Lessons need to be documented and carried forward while implementing new schemes.

In the final analysis, there is a

1. Need for holistic/comprehensive Sector policy and Sector Development strategy

This *inter alia* include the strengthening of the State Water Mission to address to the water issues, corporate/commercial service delivery in urban areas, and the community-based cost sharing model for the rural areas, preparation of a perspective plan for the water sector production, conservation and allocation.

The GoK has come out with a Water Policy 2003, in line with the Gol Water Policy 2002, which approaches drinking water and environmental sanitation on the PRIcentric, demand-driven, partial capital cost sharing and full O&M by user groups needs to be adopted as an approach for all future water sector investments. The shifting role of government at all levels from service provision to facilitation is necessitated by the hard realities of ensuring institutional, financial, and technical sustainability of investments. This is also in line with the GoK's policy of decentralized planning based on the principle of subsidiarity.

2. Need for Innovative Strategies for Inclusion

The hitherto uncovered hamlets and households are to be provided with adequate and safe drinking water. Generally, the left outs are more marginalized and vulnerable segments. Approaches should be formulated to ensure inclusion, especially under the demand-driven scenario. Safety nets, water vouchers, cross subsidies, payment through labour, support through SHGs and thrift /credit societies could be dovetailed into the investment plan. This would go a long way in ensuring better service levels to the households as well as address quality concerns.

3. Regulatory framework

The role for a regulatory framework in DWS is critical when there are multiplicity of actors and players and the provider is made directly responsible to the users. The following table, *inter alia* provide the role for a regulatory framework.

	Functional area		Regulatory options
•	Competing uses	•	Decide priorities according to policy goals under welfare criteria and equity (including inter- generational)
•	Ground Water abstraction	•	Protect critical areas, compensatory recharge, conjunctive uses and sustainability
•	Conflict Resolution	•	Water as a platform for cooperation; resolve macro-micro conflicts (inter district- inter GP

		etc.)
 Tariff setting 	•	Determination of cost of production, bench marking, tariff fixation, arbitration
Water Quality	•	Ensuring quality standards, penalize violation
 Private Participation 	•	Transparent contracting, standardization of bidding documents and process

Further, it could be concluded that to sustain the demand-driven, decentralized service delivery model in water and sanitation sector, within the overall framework of a cascading model, the following strategy will be helpful.

- Enhance knowledge, attitudes and management practices at the apex and middle (policy and programme) level.
- Build skills and facilitate the development of attitudes necessary for bringing about change in the sector, at all levels of stakeholders.
- Demystify technology, share information, thereby enabling communities to arrive at informed choices
- Synchronize capacities in tune with the project components and scheme cycle.
- Focus on the output-oriented capacity building of communities.
- Synergise various components of the project like water supply, sanitation, ground water recharge, sanitation, hygiene promotion, etc., with other related components.
- Continuous feedback, documentation, and sharing of learning experiences/ best practices.
- Transfer management, technical and social skills to the community for long-term community management ensuring sustainability and development.
- Provide requisite institutional and legal framework

The above option should be complimented with aggressive community empowerment and social marketing programmes from the State. The *Panchayats* should be prompted to effectively do aquifer/watershed-based planning, carry out gap filling exercises, which would enable them to effectively pool counterpart share in the sanitation/rejuvenation activities at the GP level.

The future approach should be to develop a localized strategy. The issue needs to be addressed holistically wherein solutions should be practical and most importantly acceptable to the users.

The areas that need further reinforcement would be:

- To promote intervention measures to sustain and subsequently increase the ground water level, which naturally would make available perennial sources or ensure sustained sources for existing large water supply schemes.
- Educate on conjunctive use of water. People should be made aware to avail local resources for alternate uses, instead of looking forward to piped water supply for meeting all their water requirements.

Annexure 4.2.1

Feasible Technological Options for Fluoride under the Situation of Karnataka

Nalgonda Technique

The Nalgonda technique basically depends on the following chemical/physical processes.

Coagulation and flocculation: Coagulation is the process in which chemical reaction takes place leading to the formation of micro flocs. This is achieved by adding and rapidly mixing a chemical coagulant (usually alum) to the fluoride containing water. The quantity of chemicals to be added depends on the fluoride content in the water to be treated. Flocculation is the process in which the micro flocs grow into larger, suspended flocs. During flocculation, which is achieved by prolonged, slow mixing of both dissolved and suspended matter in the water will be adsorbed on to the flocs.

Sedimentation: Following flocculation, the flocs will settle to the bottom to form a sludge layer containing all the particles adsorbed on to it and leaving the upper layer water free from the impurities. The efficiency of sedimentation depends upon factors such as the settling time, water temperature and the shape of the container. At the end of the process, the supernatant water is withdrawn avoiding possible re-suspension of the flocs.

Activated Alumina Technique

Another technology option for fluoride removal from drinking water is through the process of ion exchange using activated alumina in granular form. When fluoride containing water is passed through a layer of activated alumina, the fluoride anions are removed through hydrolytic adsorption. The optimal removal of fluoride by activated alumina occurs at a pH of around 6. The minimum recommended empty bed contact time is five minutes.

The potency of activated alumina gets exhausted over a period of time when it needs to be regenerated. This is usually achieved by passing a solution of 0.5 - 2.0 % NaOH through the activated alumina followed by rinsing of the bed with an acid (HCl or H₂SO4) solution. Finally, the raw water is allowed to flush the activated alumina bed before it is ready for the next cycle of defluoridation.

Prior to deciding on the choice of the technology, the source water should be re-tested for alkalinity, TDS, hardness, sulphate and fluoride contents. If alkalinity is too high the Nalgonda technique may be preferred. If TDS and hardness are high, opt for activated alumina technology (domestic / community installation). If Nalgonda technique is the choice, hand pump attachment is not recommended.