Chapter – 2
CONCEPTUAL FRAME WORK

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In this chapter an attempt is made to develop the overall conceptual framework with reference to water availability, shortages and efforts put up to solve the situation of water shortage. To begin with, the international scenario is presented. Thereafter, at national level initiatives taken in different five year plans, to tackle the problem of water availability is summarized. After this, the efforts put up at Gujarat level to solve the problem of water shortage are discussed.

2.1 INTERNATIONAL SCENARIO

Water is an essential resource for life. It is also a scarce resource, both in quantity and of an appropriate quality. It is estimated that 1.1 billion people in developing countries do not have access to safe drinking water.[1] In a broader sense, water resource management as a concept may outline a framework for numerous water related decisions. Given the fact that socio- economic development processes relate to the water resource, owing to interaction between water and human activities, it is imperative to conceptualize the problem in hand with respect to economic, environmental and institutional aspects.

In many countries it is evident that the rural water supply sector has gone, or is still going through, a process of change as broader decentralization efforts continue to be implemented; and the water sector itself has been subject to reforms. Chief amongst these reforms is the separation of functions including planning, operation and regulation of services. The findings of the various country studies point to a taxonomy of models at the level of the service provider, which comprises four main options: community-based management, direct public sector provision, private sector operators and self-supply.[2]

Another related trend illustrated by the studies is that there is an emerging but growing role for small-scale private operators to improve service provision for rural populations. Population growth and higher density rural growth settlements are making the distinction between the demands and solutions of these populations and the truly low-density rural villages and hamlets increasingly clear. Demand for higher levels of service, better and more competent management, and increased opportunities for revenue collection all point towards a more professionalized service.[2]

Adopting a Service Delivery Approach means having systems and capacity in place at the decentralized level to support different service providers in effectively operating, administering and maintaining rural water systems. Under decentralization, far greater responsibility has been transferred to local or district government; this is referred to as the 'intermediate' level of government. Results from the country studies present how these functions are understood and provided for in practice. There are situations where many of these functions are still geared towards the capital intensive part of the life-cycle, through delivery of new or rehabilitated hardware and corresponding software activities. In this scenario planning processes are primarily concerned with new physical construction, with little consideration for asset management; monitoring is focused on progress in construction and post-construction support, if considered at all, consists of a few months follow-up after completion of the project. This mode of water supply provision is most prominent in those countries where coverage is low, and the whole sector is geared towards increasing coverage mainly through implementation of new systems, for example, in Ethiopia or Mozambique. The Colombia, USA, South Africa and Thailand end of the scale shows examples of these service authorities' functions with a much greater emphasis on service delivery. This includes planning that covers the implementation of projects, long-term asset management and support to existing systems; the monitoring of progress in outputs and of the service provided; and that dedicates a greater proportion of resources to post-construction support. Service delivery approach and service delivery model two scenarios represent extremes of the spectrum, and many countries show a mixed picture with better progress in some areas than in others. There are also examples of

'recentralization' of certain functions through the creation of groupings of local government, or municipalities which share the costs of specialized technical inputs, and can reach greater economies of scale than individual local government authorities. In almost all cases, the fulfilment of service authority functions is hampered by lack of adequate financing and technically qualified staff at the intermediate level.[2]

The case studies illustrate both positive and negative examples of how sector policies and legislative frameworks have been classified to support improved service provision. Experiences from India, Uganda, South Africa and Thailand all show how having such clear leadership can accelerate the process of change and support the definition of clear policies and institutional frameworks. The findings from the studies highlight the fact that for scalability of approaches to work well, there needs to be strong policy, planning, investment decisions and capacity building done at a sector level, with the goal of setting clear frameworks for all actors to function within. This type of scalability is associated with those countries that have a relatively high degree of harmonization and alignment of sector organizations to national policies and frameworks. The converse is a situation where the water sector is fragmented, investments are made in a 'projected' way, and structural support for improved capacity is either weak or absent. Such fragmentation was seen to be problematic in countries such as Burkina Faso, Ethiopia and Honduras. The results are poorly defined policy, gaps in legislation, the absence of structured support to decentralized level actors, and confusion about who is responsible for what, particularly regarding financing different types of expenditure. Across the many different contexts the formal development of the rural water sector takes place against a complex backdrop of powerful interests, competing agendas and dynamics, many of which are never formally captured in sector documentation or evaluations.[2]

On an aggregate, these forces can often reinforce an emphasis on capital investment for financial or political gain, and conversely undermine an emphasis on Service Delivery Approaches which are less expedient. But political engagement can also be engineered for the good with examples of champions,

both politicians and senior and influential civil servants, who can support change processes and help to drive through complex reforms.[2]

Very few countries specify the financing requirements for three critical components, *viz.,* large-scale capital maintenance and replacement expenditure, and indirect and direct support costs, including the vital function of post-construction support and monitoring. In cases where this is done in a more systematic way, such as South Africa and Uganda, the resources made available are insufficient to deal with the maintenance backlog. Asset management planning, which is a relatively common tool for urban utilities, is practically unknown in the rural water sector. Following the broader trend towards improving aid effectiveness, bi-lateral and multi-lateral development partners are increasingly working within government- led national sector frameworks. But the picture is still mixed, and there are cases where donors continue to work outside of national guidelines.[2]

In considering the policy implications for how to tackle this problem, authors / researchers have identified following three broad sets of scenarios with regard to sector development[2]:

- Firstly, those countries in which coverage is really still very low, for example, Ethiopia or Mozambique from our study countries, it is an understandable strategy to largely focus on increasing coverage, but this should be as far as possible in a scaled-up manner. While much energy and resources go into building new systems, there may have to be an acceptance of a case of 'two steps forward, one step back' where levels of functionality will remain problematic. Post-construction support must be adequately addressed and financed, something that has been consistently under-funded to date. Development partner assistance to countries in this group should focus on improving alignment of programmatic support, particularly around implementation approaches, to avoid fragmentation and conflicting policies for communities.
- Secondly there are group of countries where coverage is already relatively high, reaching levels of 80% or more (e.g. India, Thailand, USA and Sri

Lanka among our study countries), which should focus very strongly on investing in systems and capacities that underpin a true Service Delivery Approach. Such steps would include developing asset management planning, providing structured capacity support to local government, ongoing post-construction support, and financial mechanisms such as rotating funds to meet capital maintenance costs, improving life-cycle cost analysis and regulation. Another important step would be to develop specific strategies to reach the last 10-15% of the unserved populations developing asset management strategies and tools for rural water services would mark another major step-change in these countries.[2]

- Lastly there are the middle band of countries where coverage is somewhere between 50-70% and expanding, but where there is also the very strong risk of slippage of functionality rates. This group of countries includes examples such as Honduras, Colombia, Ghana, Uganda, South Africa and Burkina Faso. These countries face an in-built tension between pursuing increased coverage (with inadequate budgets and growing populations) while simultaneously addressing sustainability in a more structured way. More capital investment is needed for new systems, extensions and higher levels of service in existing systems; but, equally, increasing attention needs to be paid to asset management, to improving management options and monitoring and oversight of services delivered.[2]

In whichever of the three groups of countries one fall, the cases also point towards three important underlying lessons for promoting more service oriented outcomes. One has to recognize that changes in approaches to rural water reflect profound political choices, and that one has to embrace the politics of it all. Many times change processes are strongly vested in the political agendas, both nationally and locally of all factors involved. Change processes, therefore, need to be accompanied by and embedded in political engagement activities.[2]

2.2 NATIONAL LEVEL SCENARIO

Having discussed broadly the water supply management scenario, internationally, we move to discuss national scenario. In this para an attempt is made to take an overview of water situation, water availability, fund allocation to improve the water availability over plan periods, the challenges faced in the process and the introduction of NRDWP. The review of the status up to Tenth five year plan is mainly based on research paper of Pal Brij[3].

In 1944, *Bhore Committee*[3] the first body to draw attention to safe-drinking water supply at the national scale was constituted. During the pre-independence period, this Committee laid emphasis on the safe-drinking water supply. The state government was interested in the formulation of some new policies regarding urban and rural areas in the entire state.

The *Environmental Hygiene Committee*[3] was appointed in 1948-49 by the Union Government. This committee was the first agency for an overall assessment of the country-wide problems in the entire field of environmental hygiene and it made notable recommendations in the broader field of environmental hygiene and urged for greater activities in this direction. However, the National Water Supply and Sanitation Committee appointed by the Union Ministry of Health, in 1960, had noted in its report submitted to Government of India in 1961, where specific measures were taken to implement the recommendations of the Environmental Hygiene Committee. The policy initiatives under the Five Year Plans are briefly discussed in the following lines.

First Five Year Plan 1951-56[3]: In the initial stage of the Plan, provision of water supply and sanitation schemes in the States was made from the fund under Community Development works and local government works. There was, however, no central direction or leadership provided in the matter. In 1953, in response to a circular enquiry from the Union Health Ministry, the information elicited from all the State governments showed that they were unable to make any headway in regard to their water supply and sanitation schemes due to several factors. The Union Health Ministry announced the national water policy

and sanitation programme as part of the health schemes in August-September 1954 under the Plan and made specific provisions to assist the States in the implementation of their urban and rural water supply schemes. Approved urban schemes were to receive assistance by way of loan, while rural schemes, limited to population units not exceeding 5000 (as per Census) were to be given a 50% grant-in-aid by the Centre. The other 50% was to be funded by the State governments, partly as grant-in-aid and partly as contributions from the villagers either in cash or in labour or in materials. The programme was started with an aid of US $ 2.5 million in the form of equipments and material under the Technical Co-operation programme of the United States. The First Plan had made a total provision of ₹12 crore for urban schemes and ₹6 crores for rural schemes to cover the activities during the last 18 months of the Plan period. Actual expenditure under the First Plan was of about ₹5.60 crores on rural schemes under the National Water Supply and Sanitation programme. Under the Community Development programme, the total expenditure was about ₹4.5 crores incurred on all health schemes, including water supply. It was observed that the schemes launched during the First Five Year Plan did not make satisfactory progress on account of shortage of material, inadequate transport facilities and the absence of adequate public health engineering staff in the State to plan and execute the schemes. The rural works could not make satisfactory progress primarily due to lack of appropriate organization and trained personnel.

Second Five Year Plan 1956-1961[3]: During this period problem of rural water supply varied from region to region and often within the same region. With regards to rural water supply schemes these had been taken up mainly under the programs for community development, local development, works and welfare of backward classes. These were supplemented by the national water supply that dealt with the provision of water supply to groups of villages through works, requiring a measure of technical skill in design and construction. A tentative provision of ₹28 crores was made for rural water supply.

Third Five Year Plan 1961-1966[3]: Surveys to ascertain the prevalent state of rural water supply were undertaken in a number of States. Surveys were arranged in order to have correct assessment of the extent of the problem. This

served as a basis for the detailed programs to be implemented during the Third Five Year Plan. To achieve the objective of availability of good drinking water to most of the villages in the country by the end of the Third Five Year Plan, it was necessary not only to make intensive efforts, but also to ensure that at every stage, there was an effective coordination between all agencies concerned in carrying out the programme of rural water supply at the district and block level and to mobilize local initiative and contribution to the most. Under different programs, a provision of ₹67 crores was available in the Third Plan for rural water supply. This included ₹35 crores for the village water supply programs, about ₹16 crores under the plan of the State under health, about ₹12-13 crores under the community development programme and abuts ₹3-4 crores under the programs for the welfare of backward classes. It was proposed that there should be a broadly agreed programme at the local level under which all provisions available for water supply were effectively utilized.

Three Annual Plans 1966-69[3]: The national water supply programme commenced in August 1954 under the Union Health Ministry continued with the same pattern of financing during the Second and Third plan. During three annual plans for years, 1966-67, 1967-68 and 1968-69 except that the pattern of financing for rural water supply schemes was also available for small towns with a population up to 20,000 in 1967. Till 1968, the states were required to send all schemes to the Union Ministry of Health for approval and only approved schemes qualified for central assistance under the programme. Taking note of this development, States were delegated powers in 1968 to approve rural water supply schemes with estimates up to ₹10 lakh involving per capita cost up to ₹60. During the three Annual Plans, 478 new schemes at an estimated cost of ₹21 crores were taken up. During 1961-69, about 6,000 more villages had been provided with piped water supply.

Fourth Five Years Plan 1969-74[3]: The ongoing rural water supply schemes were supplemented by the National Water Supply and Sanitation Programme of the Union Ministry of Health. In executing the national water supply and sanitation, emphasis was laid on providing water supply to areas which suffered from water scarcity. They were to prepare technical designs and estimates of rural water

supply schemes, particularly in difficult areas, making use of the data available from the exploratory tube wells organization. A provision of ₹2 crores was made for the purpose of designing these schemes. The total requirement was large and provision of ₹339 crores was made to meet only the part need of water supply. The target for the year 1970-71 was to provide wells for 3,570 villages and piped water supply to 166 villages. An expenditure of ₹500 lakh was to be incurred during 1970-71 on rural water supply schemes. *Annual Plan of 1971-72* included construction of simple wells for 1,450 villages and completion of the pipe water supply. The annual plan for 1971-72 included an outlay of ₹485 lakh on account of rural water supply, ₹72.63 lakh for well construction programmes and ₹412.37 lakh for pipe water supply scheme. During the Annual Plan the 1972-73 for financing the rural water supply a provision of ₹640 lakh was made in the budget and an amount of ₹400 lakh was anticipated from the LIC as loan. The target for this year under well construction programme was to finance 9,787 simple measure works in progress and to take up 3695 new well works to benefit 10,434 villages. The amount proposed from the state funds for well construction programme was ₹200 lakh for financing the pipe water supply programme. For the *Annual Plan (1973-74)*, a provision of ₹44.09 crores was made in the Plans of the States and Union Territories. A provision of ₹43 lakh was made for rural water supply in 1973-74. A provision of ₹1.03 crores for the central and centrally sponsored schemes referred above had been made for the year 1973-74.

Fifth Five Year Plan 1974-79[3]: In the first three years of the Fifth Plan with a provision of ₹201.10 crores, about 57,800 villages were expected to be covered. The allocation made for the remaining two years was on the basis of providing safe water supply for addition of 53,900 villages. The provision made was of ₹180.14 crores inclusive of ₹157.87 crores under the Minimum Needs Programme (MNP). Proposals for the Fifth Five Year Plan addressed – (i) to cover the remaining problem villages with potable drinking water; (ii) to strengthen and augment urban water supply in areas which were having inadequate piped water supply and (iii) to cover predominantly industrial cities fully with sewerage facilities. In the revised Fifth Plan outlay, an amount of ₹920.41 crores was fixed for the States and UTs, and ₹591.14 crores other than

Minimum Needs Programme (MNP). There was an allocation of the outlay of ₹329.27 crores in the MNP and ₹10.27 crores fixed under central sector for water supply and sanitation. Thus, on both the programmes a total outlay of ₹930.68 was provided. (Five Year Plan)

Sixth Five Year Plan 1980-85[3]: Even after an expenditure of ₹622 crore, only 64,000 villages covering 10% of the rural population were provided safe drinking water supply facility at the commencement of the Plan. An assessment survey was undertaken at the instance of central government in 1971-72 which identified 1.52 lakh villages as falling under the category of problem and difficult villages. It has been estimated that as a result of larger investments since then a little over 1.04 lakh problem villages would have been covered by March 1978, leaving only 48,000 difficult villages to be covered. According to the figures made available by the State governments, the number of these villages was about 1.45 lakh at the end of 1977-78. During Sixth Plan, there was a provision of an outlay of ₹1,407 + ₹600 crores under MNP, but the expenditure incurred was ₹1,497.90 + ₹908.66 crores.

Seventh Five Year Plan 1985-90[3]: The rural water supply continued to be a part of the MNP launched in the Sixth Five-Year Plan. In order to achieve the maximum coverage of rural population during the Seventh Plan, the scope of rural water supply under MNP needed to be extended to all villages, whereas it was restricted to identify problematic villages until the end of the Sixth Plan. It may be noticed that during the Sixth Plan period, there was a quantum jump in investment in this sector, especially with regard to the provision of rural water supply. It was considered necessary to plan and develop the prime natural resources carefully under the given national perspectives. For the *Annual Plan* 1989-90, a major objective under the MNP was to provide safe drinking water supply as per the approved norms to rural population in the residual problem villages by 1990. The National Technology Mission on Drinking Water was launched in October 1986. During 1988-89, an approved outlay was kept at ₹563.81 crores under MNP and ₹409.75 crores under the centrally sponsored Accelerated Rural Water Supply Programs (ARWSP). The target for the Annual Plan 1989-90 was to provide safe drinking water supply in 16,671 ‘no source’

category problem villages to provide additional source in 32,822 partially covered villages and 2,298 non- problem villages with an outlay of ₹1,008.60 crores. In the year 1989-90, ₹598.85 crores under the MNP and ₹409.75 crores under ARWSP were provided to expand the rural water supply. The main objective in this year was to provide safe water to the 5,295 'no source' villages with the assistance of ₹1,093.43 crores. Providing safe water to the rural population under the MNP continued to remain at the top priority in the Annual Plan 1990-91. The main objective of this Plan was to provide 40 litres per capita per day (lpcd) water to every individual within the limited resources. In 1990-91, a provision of ₹37.48 crores was made for village sanitation system programs under which an amount of ₹17.48 crores had to be spent under MNP.

Eighth Five Year Plan 1992-97[3]: At the commencement of the Eighth Plan period, there were about 3000 'no source problem' villages. The norms which were adopted envisaged a source within a walking distance of 1.6 kms, or elevation difference of 100 meters in hilly areas and at least one hand pump/spot source for every 250 persons, the accessibility of drinking water supply to the people was to be progressively improved upon. The Eighth Plan provided an outlay of ₹16,711.03 crores of which ₹10,743.03 crores was under States/UT Plan and ₹5,968.00 crores under Central Plan for water supply. This was about 3.85% of the total public sector outlays. This includes loan assistance from LIC as well as external assistance from the World Bank and bilateral agencies. Out of 1.43 million rural habitations in the country, 1.40 million habitations had access to safe water.

Ninth Five Year Plan 1997-2002[3]: In 1998-99 and 1999-2000 the Standing Committee gave comments on the reduction in physical and financial achievement under ARWSP and MNP. According to Economy survey the Central allocation for the ARWSP was enhanced from ₹1,960 crores in 2000-01 to ₹1,975 crores in 2001-2002. The Ninth Plan envisaged 100% coverage of all habitations with safe drinking water together with the installation of a quality monitoring and surveillance system all over the county, evolving cost-effective and socially acceptable operation and maintenance strategies, re-orienting the structure and functioning of rural water supply planning and implementing

agencies and taking measures to ensure sustainability of drinking water. The salient features of this policy were as follows:

- In the revised guidelines, the criteria of funds under ARWSP to the States based on normative criteria should be replaced with a need-based approach to achieve the objectives of coverage within the time frame set by the National Agenda for Governance of the Central government. The more affected areas like drought prone, desert regions would get more allocation.
- Institutionalizing community based demand driven rural water supply programme with cost sharing instruments by communities, gradually replacing the current supply-driven and centrally maintained non-people participating rural water supply programme.

Sector Reform Program called "Swajaldhara" with partial capital cost sharing and full responsibility of operation and maintenance by users was taken up on a pilot basis to institutionalize community- based decentralized rural water supply schemes.[4] The reform policies in the rural drinking water sector were adopted in 1999 through *Sector Reform Programme (SRP)* and being scaled up under the *Swajaldhara* program launched, on 25th December 2002. Governments of India policies clearly provide the right principles and direction, including: decentralization of funds, functions and functionaries with communities or *Panchayats* planning, implementing, operating, maintaining, and managing drinking water schemes. Partial capital cost sharing by the communities and full ownership of drinking water assets with *Panchayati Raj* Institutions (PRIs). Full operation and maintenance of single village scheme by the concerned village water supply committee under the aegis of the Gram Panchayat. This shift envisages a demand- responsive approach, community participation, decentralization of powers for implementing and operating drinking water supply schemes with government playing the role of a facilitator. Government of India has brought about a paradigm shift in policy directions by introducing specific reforms to improve the coverage and sustainability of the Rural Water Supply and Sanitation (RWSS) sector.

The SRP integrated the concepts of demand-led not only through decision-making but also through cost sharing. Ten percent of the capital cost and 100% of the operation and maintenance costs are to be borne by beneficiaries, with the central government providing the remaining 90% of the capital cost. The SRP transformed into Swajaldhara Program in 2003, thus scaling-up reforms to a national level. The principles of the Swajaldhara Program are similar to those of the Sector Reform Project. The demand-driven approach is central to the program, the key components of which are community-led decision-making processes, community sharing of costs and emphasis on service delivery. A change in policy for rural water supply has been adopted under the Sector Reform Programme and Swajaldhara program, the challenge continues to be the implementation of this demand-driven approaches.[5]

Tenth Five Year Plan 2002-2007[6]: The new policy initiated in April 1999 asked the States to implement 'Sector Reform' measures and adopt a demand driven approach based on empowerment of village water and sanitation committees, 10% of capital cost sharing and 100% sharing of operation and maintenance cost by users etc. The new strategy rightly relied heavily on the use of central/State funding as a critical incentive to drive the sector reform process at both the state and local level. The sector reforms such as improving capacity of the local people to manage water resources and to make them pay for the supply were not considered politically or administratively popular decisions. The 10th Five Year Plan was an initiative to implement the policies in an effective manner.

Despite good monsoons continuously for the last twelve years and high priority from Government of India for the programme of augmenting the supply of drinking water by way of funds and attention, the problem of potable drinking water has remained unresolved and in fact becoming more serious every year. Although, the Ministry of Rural Development claims more than 95% coverage, independent reports show scarcity of drinking water in about half of the villages of India[7].

The Tenth Plan goal of providing drinking water to all habitations and making them "fully covered habitations", out of the 81,787 rural habitations, 55,149

habitations were fully covered (40 lpcd and above), 25,670 partially covered (10-39 lpcd) and 968 habitations were not covered (0-9 lpcd) by 1.4.2006.[8]

Bharat Nirman Phase I (2005-2009) *and II* (2009-12) this programme, launched in 2005-2006 has six components, namely rural housing, irrigation potential, drinking water, rural roads, electrification and rural telephony. Thus, rural drinking water is one of the six components of Bharat Nirman.[9] The fund allocation for rural drinking water, under Bharat Nirman has been increasing year after year. From the year 2012 – 13 funds provided under the NRDWP are counted towards the Bharat Nirman and no additional funds are provided separately under Bharat Nirman[10]. Hence the details provided in Table 2.1 relate to 2005 – 06 to 2011 – 12 only.

Table: 2.1 Bharat Nirman Rural Drinking Water Fund Allocation

Year	Fund Allocation (₹ Crores)
2005-06	4,098.00
2006-07	4,560.00
2007-08	6,441.69
2008-09	7,300.00
2009-10	7,989.72
2010-11	8,986.74
2011-12	6,272.22

(Source: Economic Survey 2009 to 2012)

Eleventh Five Year Plan 2007-2012[11]: Since the First Five Year Plan (1951-1956), Government of India (GoI) and State governments, have till December, 2011, spent about ₹1,45,000 crores on rural drinking water. Under the current Eleventh Five Year Plan (2007-2012), the total expenditure is likely to exceed ₹90,000 crores, and it is certain that investment in rural water supply was to increase even more[10]. Eleventh Plan envisages provision of safe drinking water to all rural habitations. Under ARWSP fund allocation being implemented since 1972-73 to achieve the objective.[12] This programme was revised with effect from 1-4-2009 and the NRDWP was made responsible to provide funds for this programme.

ARWSP funding of Centre-State share ratio of 50:50 would need to contribute in order to ensure that States give priority to the supply of safe drinking water and more funds flow to this sector.[13]

Table: 2.2 ARWSP Rural Drinking Water for Fund Allocation

Year	Fund Allocation (₹ Crores)
Fourth five year Plan	30.00
Fifth five year plan	329.27
Sixth five year plan	1,407.00
Seventh five year plan	409.95
Eighth five year plan	1,170.86
Ninth five year plan	1,960.00
2004-05	2,900.00
2005-06	4,060.00
2006-07	5,200.00
2007-08	6,500.00
2008-09	7,300.00
2009-10	8,000.00
2010-11	9,000.00
2011-12	9,350.00
2012-13	10,500.00
2013-14	9,348.40
2014-15	9,250.00

(Source: compiled from Pal Brij, Economic Survey and NRDWP)

Twelfth Five Year Plan (2012-2017)[14] : It is financing of service augmentation and operation and maintenance of schemes with reforms like recovery of user charges, maintenance of accounts at Gram panchayat level, reduction of water wastage, protection of drinking water sources etc., so that investments are linked to service outcomes, i.e., they are performance based. Financing should not be a one- time grant. Water security planning requires annual investments in new schemes and works, operation and maintenance, replacement and expansion as well as support activities like water quality testing. Rural water supply schemes are predominantly financed from public funds. Scenario 1 describes over 55% pipe water supply coverage and fund allocation and the scenario 2 describes the requirement of funds and plan of investment by center and states Government.

Scenario – 1

The States of Andhra Pradesh, Arunachal Pradesh, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Punjab and Tamilnadu already have more than 55% piped water coverage as per Integrated Monitoring Information System (IMIS). These States are allocated about 35% of the total NRDWP allocation as per present criteria. These States would require funds for raising their present covered population from 40 lpcd to

55 lpcd. The remaining States would require funds for raising the coverage of piped water supply from their present levels to 55% population at 55lpcd. The total requirement of funds in the first scenario would be ₹2,72,377 crores.[14]

Scenario – 2

In the second scenario the balance of all India rural population required to be covered to reach 55% coverage is calculated and a uniform per capita cost of ₹3,600 taken at present prices. This would cover only those States where the rural population covered is less than 55%. For the 13 States that have already crossed 55% coverage a proportionate allocation of 35% is made. The requirement of funds in the second scenario works out to ₹3,03,165 crore. At the macro level this level of funding appears to be within the feasible range. The total planned investments by Centre and States under the XI Five Plan is about ₹1,00,000 cr. including NRDWP, State Plan funds, Finance Commission grants and external assistance.[14]

2.2.1 Issues and Challenges

More than 96 % of rural habitations - or 720 million people - have access to water infrastructure to supply them at least 40 lpcd of water. This wide coverage is a reflection of the investments made by the Government of India over the years. But, while access to water supply has increased over the years, this does not always translate into reliable, sustainable and affordable water services. This is mainly due to the following reasons[15]**:**

- Most schemes are planned, implemented and managed by state engineering agencies and a supply driven approach was followed. The various government departments in charge of the sector often have overlapping responsibilities.
- Beneficiary groups are generally not involved in the design, implementation and maintenance of schemes and the involvement of *Panchayati Raj* Institutions (PRIs) (local governance bodies) is limited.

- Subsidies are often poorly targeted and ad hoc. This increases the possibilities of schemes being inefficiently managed. Thereby continuously adding to an increasing number of defunct /partially defunct schemes.
- Depleting ground water tables /deteriorating ground water quality is a continuing threat.

India's twelfth five-year plan (2012–17) has focused attention on technical, social, scientific issues. The plan puts great emphasis on aquifer mapping, watershed development, and efficiency in developing irrigation capacity. Because water is a state subject in the federal constitution, state governments are expected to play a large role in these efforts. At the same time, many active NGOs are now able to enforce compliance with environmental obligations through the Right to Information Act, active and competitive media, and growing awareness on water issues.[16]

2.2.2 Background of National Rural Drinking Water Programme

Rural drinking water supply is a State subject and has been included in the Eleventh Schedule of the Constitution of India, among the subjects that may be entrusted to Panchayat by the States. To accelerate the pace of coverage of problem villages with respect to provision of drinking water, the Government of India introduced the Accelerated Rural Water Supply Programme (ARWSP) in 1972–73, to support States and UTs with financial and technical assistance in implementing drinking water supply schemes in such villages. In order to address the major issues like sustainability, water availability and supply, poor water quality, etc., the Rural Drinking Water Supply Guidelines were revised effective from 1.4.2009. The revised program is known as National Rural Drinking Water Programme (NRDWP).[17]

NRDWP provision of safe drinking water is a basic necessity. The Ministry of Drinking Water and Sanitation (MDWS) administers the National Rural Drinking Water Programme, through which the Central Government provides financial and technical support to supplement the efforts of States to provide adequate potable drinking water to the rural population. Rural drinking water

supply is a State subject and has been included in the Eleventh Schedule of the Constitution of India, among the subjects that may be entrusted to Panchayats by the States.[18]

The prime objectives of the NRDWP Mission are: (i) to ensure coverage of all rural habitations especially to reach the unreached with access to safe drinking water. (ii) to ensure sustainability of the systems and sources and (iii) to tackle the water quality problems in affected habitations.[19]

Components of the NRDWP[20]

At the central level the programme fund available for different components were as follows: water sector relating to NRDWP availability, sustainability and quality the components under the programme on which all funds, except the earmarked 5% water quality and 2% natural calamities fund.

(I) The Central Level : 10% of the annual NRDWP allocation is allocated to North East States on 90:10 Centre and State sharing Pattern. 10% of the annual NRDWP allocation was to be made to States with Desert Development Programme areas on 100% Central share basis. 5% of the annual NRDWP allocation was to be earmarked for allocation to States having chemical contamination of drinking water sources. This was to be funded on 50:50 cost sharing basis except for North East states and J&K for which it was to be 90:10 between the Centre and States. 2% of the NRWDP funds were to be retained by Ministry of Drinking Water and Sanitation (MDWS) and used for providing assistance to States/UTs to mitigate drinking water problems in the rural areas in the wake of natural calamities. The remaining 73% of the NRDWP funds was to be allocated among the non-North East States on a funding pattern of 50:50 except for J&K for which it was to be on 90:10 sharing basis between Centre and State. To meet the emerging challenges in the rural drinking water sector relating to NRDWP availability, sustainability and quality, the components under the programme on which all funds, except the earmarked 5% Water Quality and 2% Natural Calamities fund. The details are presented in Table 2.3.

Table: 2.3 Components, Purpose, Distribution and Centre-State Sharing Pattern of the NRDWP at Central Level

Components / Purpose	NRDWP Central Allocation	Centre- State Sharing Pattern
North East States	10%	90:10
Non North East States	73%	90:10 to North East and J & K and 50:50 to other States.
Desert Development Programme Area states	10%	100% Central share
Water, quality for chemical contamination and affected states	5%	90:10 to North States and J & K and 50:50 to other states
Natural calamities	2%	100% Central shares

(Source: NRDWP Guideline Report 2015)

(II) The State Level[20]: At the state level the programme funds available for different components were as follows: coverage, quality, operation and maintenance, sustainability and support, water quality monitoring and surveillance.

47% of the annual NRDWP funds were to be allocated for coverage, which were to be allocated amongst States/UTs on the basis of prescribed interstate allocation criteria. For the 20% of the annual NRDWP funds were to be allocated for tackling water quality problems to enable rural communities to have access to potable drinking water. A maximum 15% NRDWP funds were to be allocated to be used by the States/UTs on Operation and Maintenance of rural drinking water supply schemes. The funding pattern for coverage, water quality and Operation and Maintenance components were on 50:50 basis except for the North-East States and J&K for which the funding pattern was 90:10 basis between the Centre and the States. A maximum of 10% of the NRDWP funds were earmarked on a 100% Central share basis to be allocated among States/UTs, which was to be used to encourage States/UTs to achieve drinking water security through sustainability of sources. 5% of NRDWP funds on a 100% Central Share basis were used for different support activities which were required to be carried out in order to enable the rural communities to have access to assured availability of potable drinking water. For Water quality monitoring 3% of NRDWP funds on a 100% Central share basis were allocated. At the State level the programme funds available for different components are presented in Table 2.4.

Table 2.4 Components, Purpose, and Distribution and Centre-State Sharing Pattern of the NRDWP at State Level

Components	Purpose	Distribution of State NRDWP Allocation	Centre- State Sharing Pattern
Coverage	For providing safe and adequate drinking water supply to unserved, partially served and slipped back habitation	47%	90:10 (for North East states and J&K 50:50 (for other states / UT)
Quality	To provide safe drinking water to water quality	20%	
Operation and Maintenance	For expenditure on running repair and replacement costs of drinking Water supply projects	15% Maximum	
Sustainability	To encourage states to achieve drinking water security at the local level through sustainability of sources and systems	10% Maximum	100% Central share
Support	Support activities like WSSO, DWSM, BRCs, IEC, HRD, MIS and computerisation R&D etc.	5%	100% Central share
Water quality Monitoring and Surveillance	For monitoring and surveillance of water quality in habitations of field level and for setting up upgrading laboratories at states, district and sub- district levels	3%	100% Central share
Total	-	**100%**	

(Source: NRDWP guideline Report 2015)

2.2.3 Improving Service Delivery[21]

Traditionally, rural water supply has followed a supply driven approach with access to safe water being considered a social good. The financial and operational limitations of the supply driven approaches led to fundamental policy shift.

- Clarify Functions of State Rural Water Supply Institutions: As the role of the state shifts to that of a facilitator, and funds, functions and functionaries are decentralized to *Panchayati Raj* Institutions and user committees, it is important to clarify the role of state institutions and agencies in the sector.

- Strengthen Community Participation: Several examples in Uttaranchal, Rajasthan, Karnataka and Kerala show that community participation has been successful in improving rural water service delivery. Special training programs (especially for accounting, procurement, financial management) are required to improve the functional capacity of *Panchayati Raj* Institutions and user committees. Local communities and *Panchayati Raj* Institutions should have a complete understanding of the likely operation and

maintenance cost of various technology options, determined by technical feasibility, user preferences, and willingness to contribute towards capital and operation and maintenance cost.

- Transfer operation and maintenance Responsibilities of Single Village Schemes to *Panchayati Raj* Institutions: State governments hand over existing Single Village Schemes to *Panchayati Raj* Institutions/user committees, after requisite rejuvenation and repair works are carried out. It is important that these assets belong to the Gram Panchayats, and operation and maintenance responsibilities are fully borne by beneficiaries.
- Establish Cost Sharing Principles: Although the programs aim to see that operation and maintenance cost is fully recovered through user charges (except for high cost schemes which are not affordable), transparent criteria need to be developed to determine affordable contributions and the required state subsidy to ensure that the poor are not hit.
- Carry out Independent Appraisal of Multi Village Schemes: Multi Village Schemes should be taken up only when Single Village Schemes are not technically feasible.
- Address Groundwater Depletion and Quality Issues: The Groundwater Act 1986 needs to be effectively implemented. Also, Water Quality Monitoring Programs need to be better designed and routinely implemented.
- Implement Monitoring and Evaluation Systems: Monitoring and Evaluation indicators need to provide a comprehensive coverage of inputs, processes, outputs and outcomes.[21]

2.3 SCENARIO IN THE STATE OF GUJARAT

This para discusses the state level scenario of rural water availability and water supply in the various regions. It also discusses types of schemes and sources used including Narmada and Sardar Sarovar Canal.

2.3.1 Rural Area[22]

There was no serious problem of drinking water in the state in the pre-independence period. This was largely due to the fact that ground water situation was fairly good in most parts of the state and the water was available even during droughts. In fact, construction of water extraction structures was undertaken as a part of famine relief works to supply water to people. Probably the first acute shortage of water in Gujarat was noted during the droughts of 1960-61. The first survey of drinking water was conducted in 1963-64 to study the problem among 6,000 villages. The survey reported total 18,091 villages that about 1,043 villages had no dependable facility for drinking water and 3,219 villages had inadequate supply of drinking water, that is, about 16-17 % villages suffered from drinking water shortages.

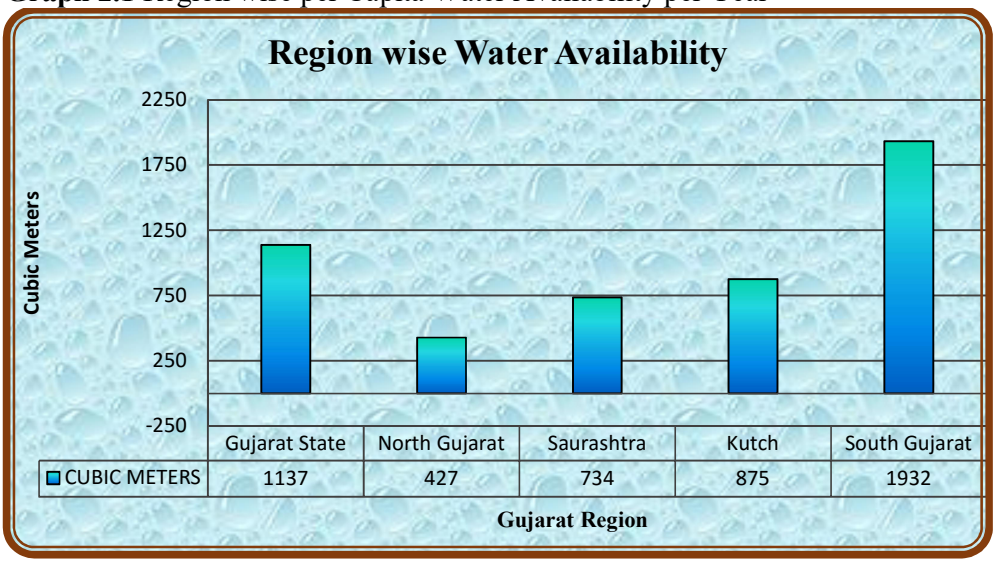
The problem acquired significant dimensions gradually with the increased use of ground water in irrigation on the one hand and the declining traditional systems of managing local water supply on the other hand. In the Fourth Plan, the concept of No Source Village (NSV) was introduced to identify problem villages with inadequate supply of water, and accordingly a village was categorized as NSV if it did not have a reliable source of drinking water. The policy of the government was to identify such villages and provide them with a source. With the depleting groundwater resources, accompanied by fluctuating rainfall, the sources identified frequently turned out to be temporary. As a result, villages "with source" many times became "no source villages" with the passage of time when the temporary source dried up. The estimates of NSVs, therefore, fluctuated widely over time, from 5,086 in 1980, 4,833 in 1985, 16,351 in 1987-88 to 186 in 1990 and 416 in 1992. Since the advent of the Sujalam Suphalam Yojana in 2004, this problem has been addressed and no longer remains cause for concern.

2.3.2 Availability and Supply[23]

The total renewable fresh water available, including the annual runoff from within the state and that allocated from the neighboring states, and all the natural recharge of groundwater, is 54,593 Million Cubic Metres (MCM). This gives a

per capita renewable fresh water availability of 1,137 m^3 per annum for the year 2011. Therefore, as per water stress index ,the state can be called "water stressed", but the availability of water is heavily skewed towards south and central Gujarat, which has 69.5% of the total renewable fresh water. At regional level per capita availability in other regions in much less, at 427 m^3 in North Gujarat, 734 m^3 in Saurashtra and 875 m^3 in Kutch.[23] Following figure illustrates region wise per capita water availability per year.

Graph 2.1 Region wise per Capita Water Availability per Year



(Source: R.Prthasarathy and Ravindra H. Dholakia)

2.4 REGIONAL RURAL WATER SUPPLY SCHEME

The World Bank defines Regional Water Supply Scheme (R_nWSS)[24] as "A programme of supplying water and sanitation to rural area". In India, R_nWSS is defined as "A system, which provides drinking water to rural community". While GWSSB a nodal agency in Gujarat, defines R_nWSS as "Number of villages, when served by a common source, operated and maintained by the state government (GWSSB) is called Regional Water Supply Scheme (R_nWSS)"[23]. In the initial years there were very few pipe lined water supply schemes. Criteria of "no- source" were also non-existent. There were mainly problems of not having any existing source of water in or around the villages due to large stretches of saline land in some region. This was solved by pipelined water supply from the nearest possible source to the villages. When the number of villages served by a

common source, operated and maintained by state government (GWSSB), it is called Regional Water Supply Scheme (R_nWSS). When the source served only one village, the scheme was executed by government but operated and maintained by local body, it is called Individual Water Supply Scheme (IWSS)**.**[24]

In the late 1970s and the early 1980s the state government introduced large R_nWSS to transfer bulk water supply to problematic villages. Important among these were the Netherlands supported schemes and the World Bank assisted schemes. In the Sixth Plan the government spent ₹650 million on rural water supplies and sanitation. In 1980-81 a ten year Master Plan was designed for the period 1980-81 to 1990-91 at the cost of ₹5.72 billion. This Master Plan included two major approaches; Regional Schemes of transferring bulk water supply to problem villages and individual village schemes based on local resource, whenever possible. The number of regional schemes was very small until about 1980 (9 in 1970 and 43 in 1980, each covering three to seven villages). It jumped to 209 in 1990 and to 444 in 2000. Most of the schemes (60%) were implemented in Saurashtra and Kutch, which corresponds to the problem of local water sources in these regions in terms of quantity and quality. As per the record of GWSSB, during the last decade (1990-2000), the state government spent (at 1999-00 prices) about ₹31.54 billion to supply water. It includes ₹25.41 billion as capital cost and ₹1.10 billion as Operation and Maintenance cost on R_nWSS, about 59.66 million on water tankers and about ₹1.62 billion on Desalination and De fluoridation technology.[25]

For the year 1999-2000 private expenditure on drinking water was about ₹4.94 billion. Out of this, ₹2.14 billion were spent on purchasing domestic water purifying equipment, ₹1.61 billion on buying unbranded purified water in small and big packages, ₹880 million on branded water bottles and packages and ₹300 million on private tankers. It shows that even after huge expenses, the water supply problem in the state was persistent[25].

Regional Water Supply Scheme is primarily designed based on sources of the water supply. It is very much necessary that the source is dependable and

sustainable as well as its exploration is economical. Primarily, the schemes in India are based on sources like well, ground water storage, canal water, tankers or comparatively some hydraulic structures like dams. If ground water is available at shallow depth and it is possible to exploit economically by hand pump, the water supply scheme is based on the supply obtained using hand pumps. In smaller groups of communities storage is created by taking water from well or other sources to a higher level and supplying it to the habitation using small pipe lines, then, the scheme is identified as Mini pipe[26].

The Rural Water Supply (RWS) sector has completed decade 1980 to 1990 with major emphasis on ensuring sustainability of water availability in terms of potability, adequacy, convenience, affordability and equity while also adopting decentralized approach involving *Panchayati Raj Institutions* (PRIs) and community organizations. Adequate flexibility is afforded to the States/UTs to incorporate the principles of decentralized, demand driven, area specific strategy taking into account all aspects of the sustainability of the source, system, finance and management of the drinking water supply infrastructure. Adoption of appropriate technology, revival of traditional systems, conjunctive use of surface and ground water, conservation, rain water harvesting and recharging of drinking water sources have been emphasized in the new approach.

Where IWSS is not feasible, R_nWSS are being implemented based on assured/ sustainable drinking water sources. Local water utilities made significant investments to install, upgrade or replace equipment in order to deliver safe drinking water and protect public health. Most of these schemes were based on ground water sources[27].

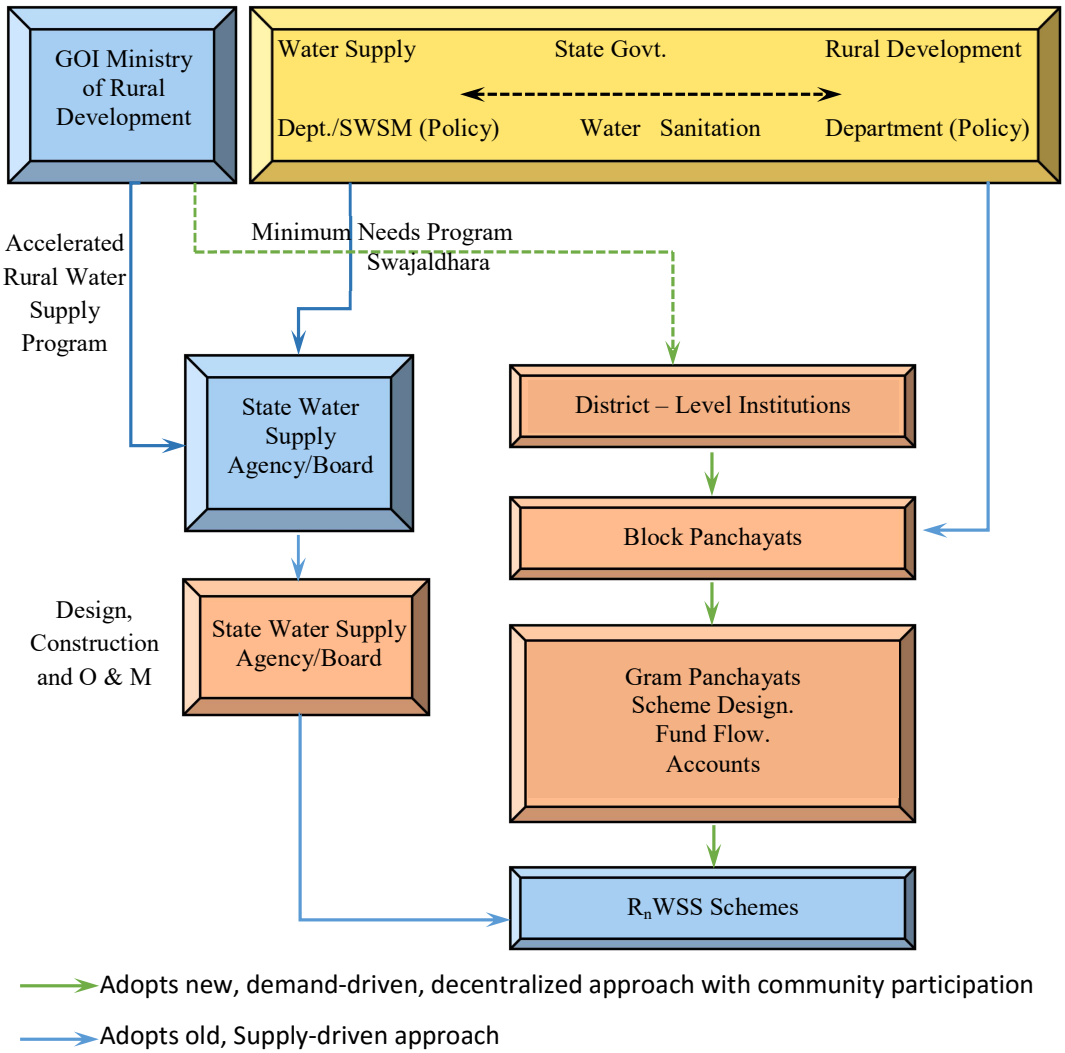
Key institutions and financial flows of current approaches

Knowledge of the real unit cost of the water is essential to understand the financial health of the scheme, and also for setting of appropriate tariffs. Usually, the unit cost is categorized into two main components, namely, capital cost and operation and maintenance cost.

In typical Institutional arrangement of India, the fund flow for supply-driven and demand-driven rural water schemes is reported as shown in Figure 2.1. It is also revealed from World Bank studies (2008)[28] in India that typically capital costs are relatively much higher in supply-driven schemes than demand-driven. Further in multi village or regional schemes with piped water supply, the capital cost averages to ₹6,000 per household (2005-06 prices) (₹10,000 or more in 16% cases and ₹20,000 or more in 4 % cases per household), however this varies greatly with local conditions.

Figure 2.1: Key Institutions and Financial Flows - Current Approaches

Rural Water Supply: Current Approaches



(Source: Report of World Bank, 2008 on Review of effectiveness of Rural Water Supply Schemes in India)

Types of Schemes[29]

To solve the quantity and quality problem of drinking water Government of Gujarat has implemented various types of schemes. In rural water supply sector mainly two types of schemes are undertaken *viz,* (i) Individual water supply scheme, which involves the supply and management of water restricted to single village or habitation and (ii) Regional or Multi-village water supply scheme, which involves several villages and hamlets for the supply and management of water. The water supply schemes are planned based on local available source, however, during the summer season as local source get dry, the scheme fail to supply water. However, under Rural Water Supply Program, various schemes are being taken up according to the technical feasibility of drinking water source under state budget from time to time. The schemes are mainly grouped as: (1) Hand pump (2) Mini pipe (3) Regional water supply schemes including those dependent on Narmada canal and Sardar Sarovar canal. The following lines discuss these schemes briefly.

Hand Pump: This scheme includes a pump operated by hand especially one for emergency use when a power- operated pump fails. Tribal areas are characterized by hilly terrain. Tribal people live scattered. The piped water supply schemes are more expensive in operation and maintenance considering the population covered in the scheme. So, Hand pumps are erected for thin population or scattered populations. Hand pump is the most feasible drinking water source, which is technically and economically sound solution looking to the topography of the area. The total number of villages covered and hand pump installed, in each district of Gujarat are presented in Table 2.5 as per GWSSB Administrative Report 2012. As per the socio- economic Review[30] published by the Government of Gujarat in tribal districts 6,830 hand pumps were installed during 2013-14 and 3,031 hand pumps were installed during the year 2014-15 (up to October-2014). By end of October-2014, total 1,61,897 hand pumps were installed in tribal districts.

Mini pipe: This scheme consists of installation of single phased power pump on bore of 165mm diameter. Water is stored in a storage tank of about 10,000 liters

capacity and then distributed on stand post. The total number of villages covered and mini pipe installed, in each district of Gujarat are presented in Table 2.5 as per GWSSB Administrative Report 2012. As per the socio- economic Review[30] published by the Government of Gujarat in 7,882 Mini pipe water supply schemes were completed up to the 2013-14 and during the year 2014-15 (up to October-2014), total 819 Mini pipe water supply schemes were completed. So, cumulative total 8,701 mini pipe water schemes were completed by the end of October-2014[30].

Table-2.5 Statement Showing the Details of Hand Pump and Mini Pipe

Sr. No	District	Total Villages Covered in Hand Pump	Total Number of Hand Pump	Total Villages Covered in Mini Pipe	Total Number of Mini Pipe
1	Panchmahal	1,201	36,963	1,318	50
2	Dahod	693	32,952	773	249
3	Vadodara	1,363	19,350	386	190
4	Bharuch	484	5,079	64	60
5	Narmada	480	8,247	206	124
6	Surat	664	14,406	280	115
7	Tapi	518	15,018	269	175
8	Navsari	375	13,896	370	267
9	Valsad	457	18,262	329	284
10	Dang	307	5,342	196	27
11	Jamnagar	7	8	0	0
12	Junagadha	6	7	0	0
13	Porbandar	0	0	0	0
14	Rajkot	43	50	0	0
15	Surendranagar	26	34	0	0
16	Bhavnagar	20	21	-	0
17	Amreli	42	50	0	0
18	Banaskantha	115	386	0	0
19	Sabarkantha	264	381	-	101
20	Maheshana	0	0	0	0
21	Patan	0	0	0	0
22	Gandhinagar	0	0	0	0
23	Ahmedabad	0	0	0	0
24	Kheda	62	144	0	0
25	Anand	204	204	0	0
26	Kutch	3	3	0	0
	Total	**7,334**	**1,70,803**	**4,191**	**1,642**

(Source: GWSSB Annual administrative report 2012)

Narmada canal[31]: This is one of the major initiatives taken by the Government of Gujarat. For this scheme master plan was prepared by Government of Gujarat for Saurashtra, Kutch, North Gujarat and Panchmahal district for an amount involving ₹8,200 crores covering 8,215 villages and 135 cities in the late 1990s.

The contribution of Narmada canal is 1.06 million acre feet (i.e. 3,582 MLD) for drinking water 2,900 MLD and for business purpose 682 MLD. All these schemes have been completed stage wise. Under the Sardar Sarovar Scheme, 5,315 village and 101 cities were planned to be provided with water supply. Sardar Sarovar Canal based scheme Bulk pipeline and distribution group promotion is presented in Table 2.6.

Table 2.6 Completed Bulk Pipeline: Sardar Sarovar Canal Basis: up to March 2012

Sr. No.	Section	Completed Bulk Pipeline March 2012 (Length k.m.)	Total Cost (₹ Corers)
1.	Saurashtra	1,811	2,119.69
2.	Porbandar District group phase -1	63	39.97
3.	Junagadh District	66	235.59
4.	Junagadh District	64	163.39
	Total	**2,004**	**2,558.59**

(Source: GWSSB Annual Reports 2014)

TIME magazine, in 1994 described the Narmada Project as one of the "Eight Modern Wonders building."[32]

Looking to the severe depletion and degradation of water resources in the state, it was decided in the year 1990-91 (9th Plan) to use water from Narmada. In 2005 a revised Master Plan for the project was prepared, which covers 9,633 villages and 131 towns from 17 districts. Some additions and deletions in number of villages have been made in this revised master plan, Villages which were found to be uninhabited during project execution were removed from the actual plan, whereas some villages were added looking into the scarcity or demand from their habitations.

Though during its initial phase the project was quite slow in terms of implementation, it covered 6,967 villages, i.e. about 72.32% villages against proposed coverage, and 114 towns i.e. about 87.78% against the proposed coverage in Table 2.7.

It is evident that 100% towns are already covered in Ahmedabad, Amreli, Banaskantha, Bhavnagar, Gandhinagar, Jamnagar, Kutch, Mehsana, Patan and Surendranagar district. On the other hand 100% villages have been covered in Bhavnagar, Gandhinagar, Kheda and Mehsana[33].

Table 2.7 Actual Coverage of Towns and Villages

District	No. of Villages to be Covered Under Narmada Water Supply	No. of Villages Already Covered	% of Villages Already Covered	No. of Towns to be Covered Under Narmada Water Supply	No. of Towns Already Covered	% of Towns Covered Under Narmada Water Supply
Ahmedabad	546	508	93.0	25	25	100.0
Amreli	615	456	74.1	8	8	100.0
Banasknta	816	454	55.6	2	2	100.0
Bhavnagar	790	790	100.0	13	13	100.0
Gandhinagar	291	291	100.0	4	4	100.0
Jamnagar	698	668	95.7	16	16	100.0
Junagadh	923	447	48.43	12	9	75.0
Kutch	886	743	83.9	8	8	100.0
Kheda	65	65	100.0	0	----	----
Mehsana	464	464	100.0	7	7	100.0
Narmada	78	31	39.7	0	----	----
Panchmahal	408	69	16.9	3	2	66.7
Patan	421	348	82.7	5	5	100.0
Porbandar	182	49	26.92	5	0	0.0
Rajkot	844	668	79.15	10	6	60.0
Sabarkantha	956	271	28.3	6	3	50.0
Surendranagar	650	645	99.23	7	7	100.0
Total	**9,633**	**6,967**	**72.32**	**131**	**115**	**87.78**

(Source: GWSSB, October 2014)

The main source is precipitation (rainfall) water which after infiltration into the ground mainly runs off and through a network of small and big streams which forms a river. Irrigation department built dams on these rivers and create reservoirs. The dams constructed on Perennial River create big reservoirs. The water from reservoirs is distributed throughout the command area by canal network. The main canals of big reservoirs are the sustainable resources not only for irrigation but for domestic use also. The biggest dam in Gujarat is Narmada dam on Narmada River. This project management and organization is done by Sardar Sarovar Narmada Nigam Limited (SSNNL) from the main canal and some from big branch canal bulk water supply line for domestic use is constructed. These bulk water supply lines supply the water to the main water scarce area, Saurashtra and Kutch[34].

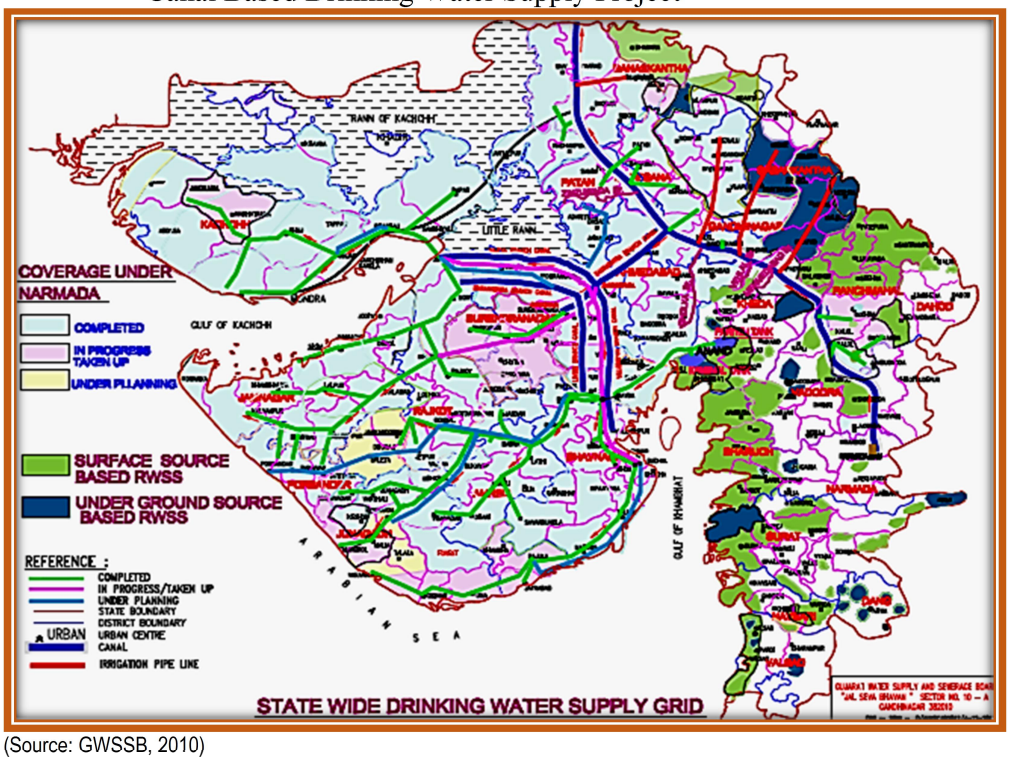
The main objectives of the project are as follows

- To supply adequate and safe drinking water to the areas suffering from severe shortage of water supply.
- To feed the regional water supply schemes, which are not providing adequate water supply due to failure of their sources.

- To provide water supply to those regional schemes and individual (village) schemes which provide poor quality of water supply due to various reasons.
- To supply potable water to those towns and villages which have excess salinity, excess fluoride or excess nitrates in their water supply.
- To reduce out migration of people by ensuring drinking water and by promoting employment in the areas suffering from water shortages.

The Sardar Sarovar Canal based Drinking Water Pipeline Project is perhaps the biggest drinking water project in the world. The capital cost of the SSCB was estimated to be ₹103.7 billion (2010 prices), which included investments in trunk mains, water treatment plants, pumping machinery, civil works and water distribution. The project included 48 bulk schemes, 123 distribution groups and a 3,250 km long pipeline network. The project is extremely important for Gujarat, as it covers 53.3% villages and 54% urban centers of the state. It covers 100% villages in Ahmedabad, Amreli, Bhavnagar, Gandhinagar, and Jamnagar, Junagadh, Kutch, Porbandar and Surendranagar districts[34].

Figure 2.2 Districts to be Covered Under Revised Master Plan of Sardar Sarovar Canal Based Drinking Water Supply Project



(Source: GWSSB, 2010)

In this Sardar Sarovar Canal based, water is transported through bulk water transmission pipelines and distribution network to the doorsteps of villages and towns, which are not included in village/towns drinking water supply infrastructure development. Thereafter, in rural areas Panchayats would take over the responsibility of distribution management, operation and maintenance of in -village water supply systems whereas local urban bodies will be responsible for distribution management, operation and maintenance in towns. The whole project was being handled mainly by three organizations: Gujarat Water Supply and Sewerage Board (GWSSB) being responsible for implementing the Distribution Network, Gujarat Water Infrastructure Limited (GWIL) being responsible for bulk transmission of water from Narmada to the villages and towns through various pipelines, and Water and Sanitation Management Organization (WASMO) being responsible for promoting water committees (*Pani Samitis*) for local management of water supply[34].

Sujalam Suphalam Yojana[35]

Sujalam Suphalam Yojana was launched in 2004 to cater to drought prone areas of north and central Gujarat. It is providing water to dry land and dry underground areas. The State Government has identified 10 worst water scarce districts of North Gujarat, Central Gujarat, Saurastra and Kutch, which are being covered under the Sujalam Suphalam Yojana (SSY). These districts are Ahmedabad, Patan, Banaskantha, Gandhinagar, Mehsana, Sabarkantha, Dahod, Panchmahal, Surendranagar and Kutch. In the schemes ₹2,46,406 crores is allocated for 4,940 villages and 31 cities. Total 32 schemes are planned for drinking water supply. Out of these, 929 villages are in tribal area. In recent construction of Sujalam Suphalam, Canal of the Sardar Sarovar Narmada Nigam Limited (SSNNL) project has provided sustainable and economic source to the regions through which it is passing. For many regions nearby which Sujalam Suphalam Canal is passing a water supply scheme has been implemented for using it as main source[35].

Table 2.8 presents, the details about villages covered under Sujalam Suphalam Scheme and the length of the bulk pipeline from 2005-06 to 2013-14. From the

Table, it can be observed that the number of villages covered and the length of bulk pipe line has grown to about 10 times over a period of 9 years.

Table 2.8 Sujalam Suphalam Scheme's Bulk Pipe Line Length and Villages Covered

Year	Villages Under Sujalam Suphalam Scheme	Sujalam Suphalam Scheme's Bulk Pipeline Length (k.m)
2005-2006	483	22
2006-2007	1,518	196
2007-2008	2,524	201
2008-2009	2,770	206
2009-2010	3,054	213
2010-2011	3,421	213
2011-2012	3,633	214
2012-2013	3,782	214
2013-2014	3,782	214

(Source: GWSSB Annual Reports 2014)

2.5 ROLE AND RESPONSIBILITIES OF THE AGENCIES[36]

For the implementation of the scheme at a state level various agencies are required to be formed, for certain legal aspects and monitoring at a state level or city level or town level or village level. For this purpose various agencies are formed in Gujarat. The following lines discuss such agencies with their jurisdiction and their role. More over for certain kind of schemes the financing may be by the state or by Municipal Corporations (or may be major agency for this purpose also is included in the following lines). Agencies are playing vital role in supply of water in the state of Gujarat. There are various agencies like Department of Narmada, Water Resources and Water Supplies, Department of Urban Development, various Municipal Corporations, *Nagar Palikas*, *Gram Panchayats* and Gujarat Industrial Development Corporation which are involved in regulating as well as administrating distribution and management of water supply from village to small cities, major city up to state level. The administrative and regulatory role of all these agencies defers, with their jurisdiction requirement and characteristics.

The implementing and administrative agencies of these segments are different. However, at planning and policy formulation stage entire water resource of the state and its management is considered in an integrated way while approaching real challenges and to set priorities. For the purposes of planning in the State of

Gujarat, four different segments are considered separately for the water supply sector namely; (i) Bulk water supply schemes (ii) Water supply schemes for rural and smaller urban areas (iii) Water supply schemes for larger urban areas, (iv) implemented by Municipal Corporations and Supply of water to large industrial users and industrial estates by GIDC. The institutional structure of water supply sector in Gujarat state is as shown in table 2.9[36]

Table 2.9 Structure of Water Supply Sector in Gujarat State

Agency	Jurisdiction	Role
Department of Narmada, Water Resources, and Water Supplies	State Level	Regulatory oversight of the water sector in the State Oversight of State government owned corporations involved in the Implementation and operation of water schemes
Department of Urban Development	State Level	Oversight of urban local bodies, excluding corporations, in matters of financial, planning and management issues. Regulation of political and administrative appointments in the local authorities
Municipal Corporations	Major Cities	Provision of retail water supply services for domestic and industrial purposes in the area of their jurisdiction
Municipalities and Nagar Palikas	Smaller Cities	Provision of retail water supply services for domestic and industrial purposes in the area of their jurisdiction
Gram Panchayats	Villages	Provision of retail water supply services for domestic and industrial purposes in the area of their jurisdiction
Gujarat Industrial Development Corporation	State Level	Mainly Implementing water supply and sewerage schemes for urban local bodies

(Source: www.udd.gujarat .gov.in/projects _water supply. php (2015)

Table 2.10 Implementation and Operation in Gujarat

Agency	Jurisdiction	Role
Gujarat Water Supply and Sewerage Board (GWSSB)	State Level	Mainly Implementing water supply and sewerage schemes for urban local bodies. Operation of some schemes. Inspection of schemes where State government fund is provided.
Gujarat State Drinking Water Company Ltd	State Level	Bulk transmission and bulk supply of drinking water to local bodies, GWSSB, and Industrial estates
Sardar Sarovar and Narmada Nigam Ltd	State Level	Wholesale supply of water
Gujarat Water Infrastructure Ltd	State Level	Development and Maintenance of Water Infrastructure for Bulk transmission and bulk supply of drinking water
Department of Narmada, Water Resources, and Water Supplies	State Level	Operation and maintenance of some river schemes like the Ukai Dam

(Source: www.udd.gujarat .gov.in/projects _water supply. php (2015))

Table 2.10 describes the role of various agencies like Gujarat Water Supply and Sewerage Board, Gujarat State Drinking Water Company Limited, Sardar Sarovar and Narmada Nigam Limited, Gujarat Water Infrastructure Limited, Department of Narmada, Water Resources and Water Supplies. These agencies are in implementation and operation of water supply related resources into their jurisdiction area.

Gujarat Water Supply and Sewerage Board (GWSSB) is an organization involved in the overall supply and management of Drinking water to rural areas of Gujarat. Table 2.11 explains how implementation and financing of various project is attributed to one or more agencies. It also explain agency responsible for operation and maintenance of various projects.[36]

Table 2.11 Various Water Supply Schemes in Gujarat State

Schemes	Implementation	Financing	Operations and Maintenance
Municipal Corporation Water Supply Projects	Municipal Corporation	Corporation finances	Municipal Corporation
Small and Medium Urban Water Supply Projects	40% by Municipalities 60% by GWSSB	75% as grant released under state no plan for the period 1-4-08 to 31-01-09 (Yr. 2008-09)	Municipality
Rural Water Supply Projects	GWSSB	State Government grant	GWSSB
Bulk Water Supply Schemes	GWSSB	GWSSB	GWSSB

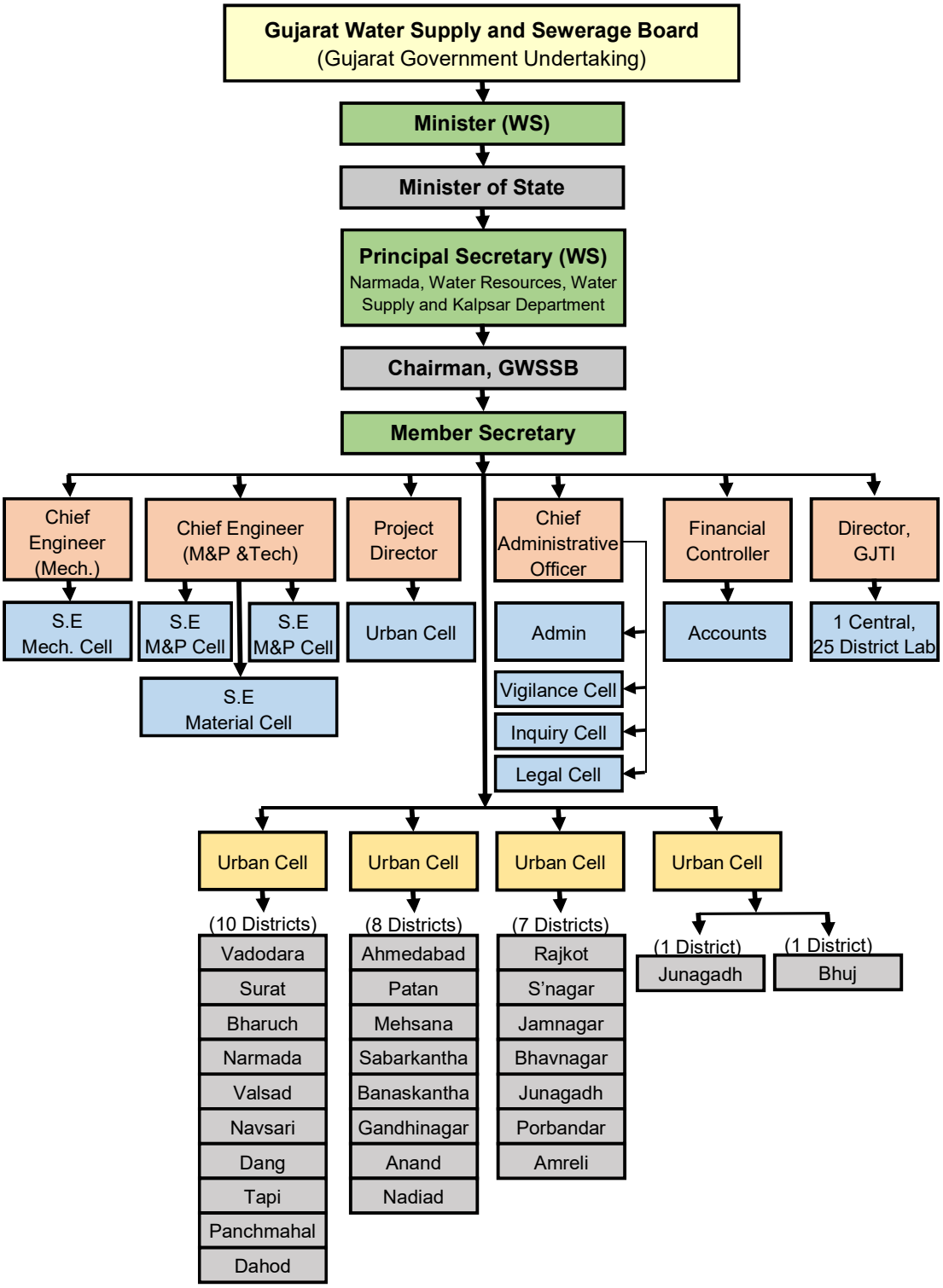
(Source: Source: www.udd.gujarat .gov.in/projects _water supply. php (2015))

2.5.1 Gujarat Water Supply and Sewerage Board (GWSSB)

GWSSB was established in 1981 with purpose of providing potable water to every person in Gujarat state. The board planned, designed, constructed and monitored water supply schemes. Its mechanical division takes care of filtration plant, pumping machinery, drilling bore and hand pump and maintains the water supply schemes. The present structure of GWSSB is presented in figure 2.3. GWSSB has been established by Government of Gujarat, to make arrangements for drinking water under Water Supply Department. GWSSB provides drinking water supply to citizens of rural and urban area of Gujarat by creating various types of water supply projects like local source based individual village water supply projects, a common source based regional water supply projects covering

multiple villages, hand pumps and mini pipe projects for hilly and scattered population regions.[37]

Figure 2.3 The Present Structure of GWSSB



(Source: GWSSB, Annual Report, 2013-14 Jal Seva Bhavan Gandhinagar)

2.5.2 Gujarat Water Infrastructure Limited (GWIL)

The Irrigation department constructs dams on rivers and canal network for irrigation purposes. GWSSB constructs water supply schemes. Some of the water supply schemes based on local sources fail, due to weak monsoon or failure of ground water source. Especially Saurashtra and Kutch regions fall in this category. GWIL a company is a public company incorporated on 25 October 1999 by the government of Gujarat. GWIL is engaged in planning and implementation of bulk water pipelines for transmission of Narmada Canal water to interior area in various districts.[37]

2.5.3 Water and Sanitation Management Organization (WASMO)

Water And Sanitation Management Organization is an independent organization of the State Government. In May 2002 a decentralized and local governing body of water supply programme was established by Government of Gujarat. WASMO was established in all villages to provide clean atmosphere and provide pure drinking water to villages in Gujarat. It is registered as a society under the Societies Registration Act, 1860 and also as a Public Charitable Trust. WASMO tries to bring change in the rural areas by changing the attitude towards cleanliness and providing pure water. WASMO operates by local partnership and local governing bodies which is its specialty. The main objectives of WASMO are: - (1) To make people responsible for their own ownership, administration and saving of water (2) To ensure full participation of all communities as well as women residents in the managing committee. (3) To provide sufficient drinking water to the whole village by the association of managing water supply committee and residents. (4) To inspire the people to preserve the rainy water and to take care of available resources.[37]

2.6 SUMMING UP

The foregoing review highlights the important issues pertaining to rural drinking water supply in the Indian context. The above analysis indicates the progress

achieved in rural drinking water supply sector in terms of Plan outlay. The regional rural water supply schemes depend upon the sources like Hand Pump, Mini pipe and Narmada canal. Over a period of time the various agencies are involved in Gujarat state to improve the scenario of water availability.

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