CASE FOR INTEGRATED DEVELOPMENT OF URBAN AND RURAL WATER SUPPLY SCHEME IN INDIA AND ITS IMPLEMENTATION STRATEGIES

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ABSTRACT

Rural water supply in India in many instances are single-village or multi-village schemes sourced from ground water. These schemes have the inherent demerits of limited / intermittent water supply, poor water quality, high energy cost of pumping from borewells, and sharp depletion of ground water table in areas where rural water supply and irrigation are both sourced from ground water. On the other hand, urban water supply schemes are better managed in terms of assured piped water supply and treated water quality, being river / reservoir based sustainable and dependable water supply schemes. However, we cannot afford to see urban islands of water prosperity in the midst of oasis of drinking water scarcity in vast rural country-side, and there lies an urgent need for integrated developement of large scale urban and rural water supply schemes in India which will ensure economy of scale and equity distribution of water to rural and urban population.

In recent times, this later trend is emerging in India with State Governments of Madhya Pradesh and Andhra Pradesh pioneering this integrated concept by inviting Aarvee Associates Architects Engineers and Consultants Pvt.Ltd to prepare the Detailed Project Reports for (i) Integrated Narmada water supply scheme for villages and towns of Dewas, Ujjain and Shajapur districts in Madhya Pradesh, (ii) Integrated comprehensive sustainable scheme for supply of drinking water to all rural habitations in Chittoor district in Andhra Pradesh.

Integrated Narmada water supply scheme will provide water supply to 1513 villages and 27 towns including industrial water demand and municipal services, lifting the water from Narmada river upstream of Indirasagar project. In water supply projects, pipeline and pumping are the major capital cost and O&M cost respectively. With meticulous planning and engineering design, the pressure main is kept as 70 km., water flow by gravity is 9675 km. in pipeline length, thus ensuring cost of production of treated water as Rs. 6.89 per 1000 litre. Rural population cannot pay for water comparable to their counterpart in towns and cities. Therefore, a differential water tariff for different segments of consumers is arrived which will fully compensate the annual O&M cost.

Integrated sustainable water supply scheme in Chittor district is planned to draw water supply for 10917 rural habitations and 8 towns, drawing water from Kandaleru balancing reservoir of Telugu Ganga canal project. Chittor district being undulating topography partly covered by the Eastern Ghats, planning strategy is to segment the district into 5 water supply zones with tapping water at 4 tapping points from the pipeline pressure main from source to the Chittor town, thus ensuring reasonable pumping costs and water distribution to all urban centres and rural habitations.

Since urban and rural water supply in all States in India is controlled by several departments and agencies, implementation strategy of an integrated urban and rural water supply scheme would ideally be through "Special Purpose Vehicle (SPV)" system, amongst many alternativies, which will build and operate the scheme (i) to avoid duality of execution and day-to-day functional issues and (ii) equity distribution of drinking water to all sections of the rural and urban consumers.

1. INTRODUCTION:

Safe drinking water supply is very important as over 80% of health problems are due to consumption of unsafe water. Increasing health awareness among the population in India in recent times underlines the additional attention to be paid to the subject. Hence, one of the most important programs of the governance in India at central and state levels is the provision of adequate and safe drinking water to the population. This importance is reinforced in the **National Water Policy 2002 (1)**, which spelt out water allocation priorities as:

- Drinking water
- Irrigation
- Hydro-power
- Ecology
- Agro-industries and non-agricultural industries
- Navigation and other uses.

in that order. Further, it directs that, "adequate and 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".

Although domestic water supply consumes no more than 5% of total water consumption in the country, Indian water supply scenario, by various yardsticks, is not very encouraging. For example (2):

- No major Indian city has a 24 hour supply of water, with 4 to 5 hours of supply per day being the norm.
- Piped water supplies 69% of households in large cities, 45% in smaller cities and towns, and only 9% of rural households.
- Hand pumps are still the predominant source of drinking water in rural areas.

2. WATER SUPPLY SYSTEMS IN INDIA

2.1 Rural

In rural water supply, two types of schemes are usually adopted: (i) Single Village Scheme (SVS) and (ii) Multi-Village Scheme (MVS). The source of water supply for SVS schemes are mostly bore wells, whereas, when the ground water sources in villages do not satisfy the quantity and quality requirement, then MVS schemes are adopted with source of water supply from surface water. When population of a village or a group of villages is more than 500, then Protected Water Supply (PWS) for SVS / MVS is provided which includes piped water supplies to stand posts / cisterns and house connections. Provision of water supply is kept as 40 litre per capita per day (lpcd) for rural areas. Thus in nutshell, the drinking water facilities in rural areas in India are provided by the Rural Water Supply & Sanitation department or by the Gram Panchyat in most States by following means:

- Spot sources (bore wells fitted with hand pumps)
- Protected Water Supply Schemes (for single habitation/village)
- Comprehensive Protected Water Supply Schemes (for a group of habitations/ villages).

However, these schemes have the inherent demerits of limited / intermittent water supply, poor water quality in terms of hardness, fluride / arsenic contents, etc. , high energy cost of pumping from borewells, and sharp depletion of ground water table in areas where rural water supply and irrigation are both sourced from ground water.

2.2 Urban

In urban India, situation is completely different. The concentration of human activities in most of the urban settlements intensifies local competition for all types of resources, amongst the most vital of which is water. The supply of adequate , clean drinking water and the provision of adequate flows for the disposal of water-borne wastes are essential to those who are living in towns and cities, but these essential facilities are lacking in desirable services in most instances. Urban water supply is sourced from rivers, lakes, dam / storage reservoirs . Urban water supply is planned for 30 year population projection with per capita supply of 70 lpcd for towns without underground drainage (UGD) facilities, 135 lpcd for towns with UGD facilities and 150 lpcd for cities.

Many of these urban centers were set up near the water sources to begin with. Having exhausted the nearby water supply sources, many of Indian cities are now reaching out to far away sources for their water supply needs as can be seen from Table-1.

For example, to meet additional urban water supply demand of 2205 MLD for a projected population of 24 million by 2051 in Greater Hyderabad Municipal Corporation (GHMC), Hyderabad Metropolitan Water Supply and Sewerage Board (HMWS&SB) has planned sourcing water supply from Pranahita-Godavari river system which is at a distance of 316 km. from Hyderabad(3). Implementation of first phase (735 MLD) of the project is currently in progress.

Table-1: Cities Reaching out to New Sources of Water Supply

City	New Source	Distance to New Source (km)
Bangalore	River Cauvery (Krishnarajsagar reservoir)	100
Ahmedabad	River Sabarmati (Dharoi reservoir)	150
Hyderabad	River Krishna (Nagarjunasagar reservoir)	160
Delhi	River Bhagirathi (Tehri dam) Renuka Dam (planning stage) Kishau Dam (planning Stage)	250 280 300
Chennai	River Krishna (Telugu Ganga canal project)	400
Mumbai	Bhatsa Dam	54

2.3 Need For Synergy In Urban-Rural Water Supply

Towns and cities are few urban islands with high concentration of population in an oasis of numerous villages and habitations in the vast rural country-side. For example, there are 8 towns against 10917 habitations in Chittor district in Andhra Pradesh. There are 32 towns against 3218 villages in Dewas, Ujjain and Shajapur districts in Madhya Pradesh. Provision of per capita water supply in towns and cities being 2 to 4 times higher than per capita water supply in rural areas, size of urban water supply projects and investment are large.

However, we cannot afford to see urban islands of water prosperity in the midst of oasis of drinking water scarcity in vast rural country-side, deprivation of which, forces rural population to migrate to urban centers.

Need for synergy in urban-rural water supply is all the more obvious, when we see that,

- Pipeline from intake river / reservoir source passes through rural environ to towns and cities and there is necessity felt to provide water supply to en-route villages.
- Source for urban and rural water supply may be same, since source is always a limiting factor in water supply projects; pipeline corridor for both may be adjoining; other infrastructures like electric power and land acquisition will be duplicating for stand-alone urban and rural water supply projects.
- Ultimately, ensuring economy in cost of an integrated urban-rural water supply project will have great value.

3. Integrated development of large scale urban-rural water supply projects in india:

There are not many instances where integrated development of large-scale urban-rural water supply projects has been taken up in India. In recent times, this trend is emerging with State Governments of Madhya Pradesh and Andhra Pradesh pioneered this integrated concept by inviting Aarvee Associates Architects Engineers and Consultants Pvt. Ltd to prepare the Detailed Project Reports (DPR) for (i) Integrated Narmada water supply scheme for villages and towns of Dewas, Ujjain and Shajapur districts in Madhya Pradesh, (ii) Integrated sustainable scheme for supply of drinking water to all rural habitations in Chittoor district in Andhra Pradesh.

3.1 Integrated Narmada Water Supply Project for Villages & Towns of Dewas, Ujjain & Shajapur Districts in Madhya Pradesh (4)

3.1.1 Background

Dewas, Ujjain and Shajapur districts are situated in Malwa Plateau in western region of Madhya Pradesh. There is no perennial surface water source from which sustainable water supply arrangement can be made for the rural and urban areas in these districts. The ground water level in this region is also depleting day by day; hence the rural population faces acute water scarcity problem throughout the year. People's representatives and administrative machinery in the region frequently face public representation to provide adequate supply of safe drinking water. Keeping the urgency of the situation to ameliorate sufferings of the large sections of the rural population due to acute scarcity of safe and potable drinking water, Honorable Chief Minister of Madhya Pradesh directed the Public Health Engineering (PHE) Department to prepare an integrated group water supply scheme for villages and towns of Dewas, Ujjain and Shajapur districts with River Narmada as the source. Under this scheme, it is proposed to provide water supply to 1513 villages and 27 towns in these three districts.

3.1.2 Unique Features Of The Project Site

While Narmada is a perennial large river system flowing east to west through the heartlands of Madhya Pradesh, Malwa plateau lying north of the river is denied the advantage of utilizing the Narmada water for drinking water supply and irrigation due to Satpura hill range lying in between Narmada valley and the Malwa plateau.

The challenge was to identify the intake source from river Narmada, align the pipeline corridor along the shortest route, take the pumping main over to the Satpura hill range at a strategic location with a Master Balancing Reservoir (MBR), from where the entire water supply system will run by gravity flow to the vast service area spreading over 19,311 sq.km. to reach remote villages in the 3 districts.

3.1.3 Multi-Sectorial Water Demand

The planning perspective for meeting water supply needs of villages and towns of Dewas, Ujjain and Shajapur districts is made for the next 30 years with 2014 as the base year, 2029 as the intermediate design year and 2044 as the ultimate horizon year. Design water demands are estimated based on population projection for the identified villages and towns in these three districts for the intermediate and ultimate horizon years.

The design water demand is arrived at by considering: (i) aggregate water demands with each village and town as unit base, (ii) appropriately assess and deduct existing water supplies from the proposed water demands, (iii) a water supply scheme that meets demands for all sectors – domestic water demands for villages and towns, water demand for floating population in cities, industrial water demand and water demand for town municipalities for firefighting services. Following these criteria, total clear water demand is assessed as 530 MLD for which the entire water supply system is designed.

3.1.4 Vastness Of Piped Water Supply

Comprehensive nature of the piped water supply from intake source at river Narmada to the interior of each village can be understood from the following:

- 70 km. of pumping main from Intake to MBR.
- 1600 km. gravity mains and branches to 148 Elevated Level Service Reservoirs (ELSRs).
- 3500 km. distribution outlets from 148 ELSRs to outskirts of 1513 villages, 24 towns and 3 cities.
- 4500 km. pipeline distribution network within villages.

3.1.5 Sustainable Water Supply Scheme

One of the important elements in a social sector scheme is maintaining long term sustainability. This point has been emphasized in the NRDWP Framework. INWS scheme fits well in to the NRDWP framework as given below:

1. Source Sustainability

The largest reservoir in India in terms of storage capacity (12 billion cum.), Indirasagar Project on Narmada River lies within 70 km fetch distance from Intake point at Nimanpur, thus ensuring availability of adequate quantity of water throughout the year.

2. System Sustainability

System sustainability means optimizing the cost of production of water and devising proper protocol for O&M. Out of the three elements for O&M cost (energy cost, system maintenance cost and salary/wages cost for O&M staffs), energy cost for pumping water is the highest. Fortunately, for the Integrated Narmada Water Supply Project, there is a topographic advantage of lifting the 530 MLD water from Narmada River within a short distance of 70km in pressure main segment to deliver water supply by gravity flow to a vast service area spreading over 3 districts with more than 9675km gravity flow distribution This topographic advantage results in very low electric power requirement of 35 MW. Cost of production of water is, therefore, estimated as low as Rs. 6.89 per KL without charging repayment of the capital cost.

3. Financial Sustainability

Financial sustainability means, as per NRDWP guidelines, recovering at least 50% cost through flexible methods to be devised by the local self-government and improving energy efficiency. For this scheme, while source of funding is yet to be finalized by the PHE Department in consultation in the State Government and with the Central Government, which will determine the capital cost repayment or grant from the Central Government, what the Consultant has suggested is a modest and workable water tariff structure for various sectorial consumers as a way of revenue generation from the scheme amounting to Rs.198.0 Crore per annum against O&M cost of Rs.133.0 Crore per annum, thus ensuring long term financial sustainability of the project.

4. Social & Environmental Sustainability

This project aims to provide safe drinking water to the rural and urban population in adequate quantity (24x7 water supply), even during distress periods, duly addressing equity, vulnerability (30% BPL/SC/ST population) in 3 districts which are prone to chronic drinking water supply deficit and suffer from serious water quality issues from bore well water. Water tariff for BPL population in rural areas has been proposed as nominal Rs.15/- per month which is proposed to be compensated with higher tariff of Rs.150/- per month for the urban consumers. The DPR has, therefore, addressed adequately about social sustainability.

Today, the main concern in any infrastructure project in India is about **environmental sustainability**. While drinking water supply project is considered environment friendly, requirement of land acquisition, adequate compensation and rehabilitation for the project may pose problems. Fortunately, for this scheme, total land requirement is estimated as 90 Ha, out of which, parcel of lands of 15 Ha, 36 Ha and 34 Ha belong to the State Forest Dept., Land Revenue Dept. and private land respectively. All these lands are barren lands with no issues of R&R. Since land acquisition is not much of a concern in this project that makes the project environmentally sustainable at the implementation stage.

3.2 Integrated Sustainable Water Supply Scheme In Chittoor District In Andhra Pradesh (5)

Objective of the project is to provide drinking water supply to 10,917 rural habitations in 66 mandals and 8 towns covering whole of Chittoor district (15152 sq. km. in areal extent) in Andhra Pradesh with the source of water supply from Kandaleru balancing reservoir located in adjoining Nellore district .

3.2.1 Present Drinking Water Supply Scenario

Present drinking water supply in rural areas of Chittoor district is entirely dependent on ground water source. As of 2004-2005, drinking and domestic requirements of 10804 habitations are met through 6229 PWS and MPWS schemes and 20368 bore wells. There are several reasons for poor drinking water facilities in the district.

1. Monsoon Failure

Chittoor district receives an annual rainfall of 918.1 mm. The south-west monsoon and north-east monsoon are the major sources of rainfall for the district. On an average, the district receives 438.0 mm of rainfall through the south-west monsoon (from June to September) and 396.0 mm from north-east monsoon (from October to December). From the Mandal-wise annual rainfall data from 2000-01 to 2004-05, it is seen that, cumulative departure from the normals of rainfall are very high with average for the 66 mandals as -63%. This shows a clear case of monsoon failure in consecutive years in large track of lands in Chittoor district resulting in less recharge to ground water and less quantum of flow in rivers.

2. Ephemeral Rivers
There are no major rivers in the district. Most of the streams and rivulets are ephemeral in nature carrying rain water runoff immediately after precipitation.

3. Chronically Drone-Prone District
Based on the rainfall pattern and riverine situation in Chittoor district, it is known that, the district is one of the chronically drought affected districts in Rayalasema region in Andhra Pradesh. Rural population in the district is mostly dependent on ground water for irrigation and drinking water supply. Failure of monsoons during the last few years lead to failure of bore wells and failure of crops. This situation is creating living distress in the rural farming communities.

4. Ground Water Dependent
Ground water is the main source of drinking water especially in hard rock areas in Chittoor district. Protected drinking water supply through shallow bore wells with hand pumps was initiated by UNICEF few decades back in rural areas. Switching over to piped water supply schemes in these areas in recent times resulted in drilling of deep bore wells. As a result, withdrawal of ground water has increased to such an extent that the sustainability of these schemes became difficult. Further, the agriculturists around the drinking water sources switched over to bore well irrigation and utilization of major share of water by them lead to scarcity situation even in good ground water potential zones.

5. Need for Sustainable Piped Water Supply
In order to mitigate drinking water crisis in Chittoor district, Government of Andhra Pradesh has reviewed the water resources scenario in Chittoor district and felt it both desirable and necessary to have a comprehensive integrated and sustainable scheme for supply of safe drinking water to all rural habitations in Chittoor District. .

3.2.2 Salient Features Of The Project
Water supply scheme for 10917 rural habitations in Chittoor district is designed with Kandaleru balancing reservoir as the source. The reservoir is part of Telugu Ganga canal project of Krishna river and is located in adjacent Nellore district, about 65 km. north of border between Chittoor district and Nellore district. The reservoir is maintained by the Irrigation & CAD Department, Govt. of Andhra Pradesh for irrigation purpose. Out of a gross storage capacity of 68 TMC, 6.8 TMC (10%) is earmarked for drinking water supply as per the norm followed in the National Water Policy-2002.

There is an urban component of 3.43 TMC (265.75 MLD) for the 8 towns and rural component of 2.91 TMC (225.62 MLD) for the 10917 rural habitations. With industrial water demand of 9 MLD, total water drawal from Kandaleru reservoir will be 500 MLD. These projected water supply demands for urban and rural in Chittoor district are arrived by considering 135 lpcd for 30 years projected population for urban area and 40 lpcd for 20 year projected population for rural areas, following the guidelines of CPHEEO Manual for urban water supply and Andhra Pradesh RWS&S department Technical Manual for rural water supply. The district has undulating topography partly covered by the Eastern Ghats. To negotiate this topographic effect, the district is divided in to 5 water supply zones with 4 tapping points from the 177 km. long pressure main from intake at Kandaleru reservoir to Chittor town.

3.2.3 Complexity In Proposed Implementation

At the DPR preparation stage, there are 3 State agencies involved:

- Urban water supply to Chittoor town: This component is being carried out by the Andhra Pradesh Municipal Development Project (APMDP) with World Bank assistance. Main water supply component is the pipeline pressure main from Intake at Kandaleru reservoir to Chittoor town through 4 stage pumping.
- Urban water supply to other 7 towns: This is under the jurisdiction of the Public Health Engineering Department.
- Rural water supply to 10917: habitations This component is being carried out by the Rural Water Supply & Sanitation Department. Main water supply components provide tapping water supply from 5 tapping points from the pressure main to Chittoor town for the rural component as well as urban component for the 7 towns.

Conclusion drawn from two integrated urban-rural water supply projects:

In designing both the schemes, a host of emerging technologies like satellite remote sensing and GIS, pipeline network analysis using EPAnet–2 software, software based structural design, drawings and material quantities, Total Station and DGPS based topoghraphic survey etc. are applied to bring down design report preparation time to less than 5 months to the satisfaction of the client departments.

Integrated Narmada Water Supply (INWS) scheme is designed for 530 MLD of treated water supply to meet water demand by 2044 and cater the needs of 63 lakh population, out of which, 29% is BPL and around 26% SC, ST population. This project, when implemented, will be the largest rural & urban integrated water supply scheme in the State of Madhya Pradesh. This project not only provides the drinking water but also enhances the health & hygienic conditions in rural & urban environment. Water being one essential infrastructure commodity, it will help in boosting up the industry & economy. This project, therefore, may turn out to be a role model for similar drinking water supply projects utilizing vast potential water resources from Narmada River.

Integrated sustainable scheme for drinking water supply to 10917 rural habitations is an ambitious but doable project, parallel of which is not available in Indian water supply scene so far. For example, under the external assistance by the World Bank, rural water supply projects have been carried out in 5 States in India(6) as summarized in Table-2.

Table-2: World Bank Assisted RWSS Projects in India

State	Number of Habitations/Villages Covered	Status
Andhra Pradesh	2600 habitations in 6 districts	Commenced in June 2010
Karnataka	Jal Nirmal Project	Project period: Feb 2002 – June 2009
Maharashtra	2922 Gram Panchayats under Jalswarajya Project	Project ongoing: 2009 - 2010
Punjab	1584 villages under SWAP Program	Project ongoing: 2009 - 2010
Uttarakhand	853 habitations	Project ongoing: 2009 - 2012

From the above, it is seen that, size of the two rural water supply projects planned and number of villages and habitations covered are much larger and corresponding investments required are much more than the ongoing rural water supply schemes in the last decade in India.

4. COMPLEXITY IN PRESENT SYSTEM

4.1 Players In Decision Making In Water Supply Sector

The primary responsibility of providing drinking water facilities in the country rests with the State Governments. The efforts of State Governments are supplemented by Government of India by providing financial assistance under the Centrally Sponsored Scheme. There are 4 central ministries of the Government of India who provide financial assistance, technical and administrative clearance for the water supply projects:

- Ministry of Rural Development & Panchayat Raj : Rural Water Supply
- Ministry of Urban Development : Urban Water Supply
- Ministry of Water Resources : Water allocation for drinking water supply
- Ministry of Environment & Forest : Environment clearance

4.2 Major Funding Sources

1. Accelerated Rural Water Supply Programme (ARWSP) has been under implementation since 1972-73. In 1986, the National Drinking Water Mission, later renamed as Rajiv Gandhi National Drinking Water Mission in 1991, was launched; and further in 1999, the Ministry of Drinking Water and Sanitation was created to provide a renewed focus with mission approach to implement programmes for rural drinking water supply. In the 11th Plan period, Department of Drinking Water Supply (DDWS), under the Ministry of Rural Development & Panchayat Raj, launched the National Rural Drinking Water Programme (NRDWP) with implementation framework to provide adequate and potable drinking water on a sustainable basis to all persons living in the rural areas of our country.

2. Jawaharlal Nehru National Urban Renewal Mission (JNNURM) is administered by the Ministry of Urban Development, Government of India. JNNURM evaluates projects relevant to urban sectors on a host of issues like water supply, storm water drainage, sewerage, solid waste disposal, urban sanitation, provision of toilets, transportation, slum improvement etc. and provides necessary fund assistance to execute these projects on a turnkey basis. Duration of the Mission was 7 years beginning 2005-2006, which is likely to continue for a similar further period. In water supply, a number of projects have been executed in the past in many States in India with technical and funding assistance from the JNNURM.

4.3 Players In Implementation Of Water Supply Projects

At the implementation level, water supply projects are managed by either one of the following institutions of the States:

- Public Health Engineering Department
- Municipal Administration & Urban Development Department
- Rural Water Supply & Sanitation Department
- Urban Local Bodies / Municipalities
- Water Supply, Drainage / Sewerage Boards
- Village Panchayats

5. IMPLEMENTATION STRATEGY FOR INTEGRATED WATER SUPPLY

5.1 Need For Single Entity

From the above, it is seen that, there are too many players at the implementation level for water supply projects on piece meal basis, where source may be same, pipeline corridor may be adjoining to each other, other infrastructures like power supply and land acquisition may be duplicating efforts. For integrated development of urban-rural water supply project, bringing all these departments and agencies in a common platform for project implementation, operation and maintenance and managing equity in water distribution is a most difficult task, given the cultural distance and administrative complexities of these State agencies. In the economic reform era in India since 1992, a number of new institutional concepts have emerged specially in infrastructural development sectors. Two of these are:

- Special Purpose Vehicle (SPV)
- Public Private Partnership (PPP)

5.1.1 Integrated Water Supply Project As SPV

SPV is formed as a limited company created to fulfill specific or temporary objective. SPVs are typically used by companies to isolate the firm from financial risks and to obscure relationships between different entities which are competing to each other as stakeholders. Normally, a company will transfer assets to the SPV for management or use the SPV to finance a large project thereby achieving a narrow set of goals without putting the entire firm at risk.

Considering the complexity of the present system of decision making and project implementation, SPV concept will be ideal for integrated water supply project. Complexity in implementation of Chittoor water supply project can be resolved by forming an SPV amongst many alternativies, which will build and operate the scheme (i) to avoid duality of execution and day-to-day functional issues and (ii) equity distribution of drinking water to all sections of the rural and urban consumers.

5.1.2 PPP For Integrated Urban-Rural Water Supply Projects

Under a PPP arrangement, a concessional agreement is entered between the state agencies in charge of water supply (say a ULB) and the private developer, whereby, the private developer will be required to design, finance, construct, operate and manage the water supply services for the concession period. The capital investment required for undertaking the augmentation works will be met wholly or partly by the private developer. Post construction, the operation and maintenance of the water supply system will be managed by the private developer, including the generation of bills and collection of user charges from the consumers.

The PPP concept is already operational successfully in many infrastructure sectors in India, specially to mention, in national highway projects. In water supply and sewerage sectors in Maharashtra State, Asian Development Bank (ADB) is presently in discussion (7). In water supply projects, why the PPP mode has not come so far in India, is the risk of financial return on the capital investment to be made by the private developer, specially in rural water supply projects. With integrated development of urban-rural water supply projects on a large scale, which may also include other sectorial demand like industrial water demand and municipal services, water tariff can be appropriately devised which can provide reasonable return on investment after taking in to account the capital cost spread over the concessional period and the annual O&M cost. Proposed integrated Narmada water supply project is an example where the financial engineering in a small way has been attempted and where PPP can be initiated.

5.1.3 Provision Of Urban Amenities In Rural Areas (PURA)

Concept of PURA has been evolved by the Ministry of Rural Development in order to catalyze the convergence between different infrastructure schemes and create a new model for management of urban services in the rural areas. The mission of the PURA scheme is accelerated development of compact areas around a potential growth centre in a Gram Panchayat (or cluster of contiguous Gram Panchayats) through PPP framework for providing urban amenities and livelihood opportunities to improve the quality of life in rural areas. The scheme aims to provide urban amenities and livelihood opportunities in rural areas to bridge the rural-urban divide.

PURA scheme is proposed to be achieved under the framework of PPP between Gram Panchayats and private sector partner. Core funding will be sourced from the convergence of Central Government schemes and complemented by additional support through the PURA scheme. The private sector shall also bring on board its share of investment besides operational expertise. The PURA scheme would be implemented and managed by the private sector on considerations of economic viability but designed in a manner whereby it is fully aligned with the overall objective of rural development. To attract the private sector, the scheme has a “project based” design with well-defined risks, identified measures for risk mitigation and risks sharing among the sponsoring authorities (Gram Panchayat, Central Government, State Government and the Selected Concessionaire) (8).

5.2 Integrated Urban-Rural Water Supply as National Project

The time has now come to take up some of the major urban-rural integrated water supply projects as “National Projects”, on the model of river valley projects, both from the point of view of funding and project implementation. For example, total project outlay for Integrated Narmada Water Supply Scheme for villages and towns of Dewas, Ujjain and Shajapur districts in Madhya Pradesh is estimated as Rs.5000 crore and for Integrated Sustainable Scheme for drinking water supply to all rural habitations and towns in Chittoor district in Andhra Pradesh is estimated as Rs.6000 crore. Financial scale of such mega water supply projects cannot be met from meager State funding, given the past experience. Since in the two projects cited, respective State Government has made steps forward in preparing the required DPR and there is political will to usher in social sector improvement in the utterly impoverished water supply situation in these two regions, it will be appropriate to quickly move in this direction. It is then only social transformation in urban-rural water supply in India will take place.

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BRIEF PROFILE OF THE AUTHORS

Mr. A.K.Chakraborti did B.E. in Civil Engineering from NIT Durgapur in 1968 and M.Tech. in Advanced Hydraulics Engineering from IIT Kharagpur in 1970. Over the next 41 years, he served Irrigation & Waterways Department, Govt. of West Bengal as design engineer, NRSC / ISRO at Hyderabad as Scientist/Group Head/Group Director, IIRS at Dehradun as Professor & Head of Water Resources Division, WAPCOS at Hyderabad as Consultant/Advisor, ESCI at Hyderabad as Guest Faculty, Aarvee Associates as Advisor/Vice President. In Water Supply Engineering, he is credited with the responsibility as Team Leader for preparation of DPR for Godavari Drinking Water Supply Project, Integrated Narmada Rural Water Supply Scheme for Dewas, Ujjain & Shajapur districts in Madhya Pradesh, Integrated Sustainable Rural Water Supply Scheme for Chittoor district in Andhra Pradesh. Chakraborti has to his credit 70 publications in national/international journals and symposium proceedings.

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