

# The status and Challenges of Water Infrastructure Development ( Water Supply) In Nepal.\*

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Nepal is a landlocked country is south area, located between China to the north and India to the south, east and west. With a total land Area of 147,181 km<sup>2</sup>, the country is characterised by diverse topography, geology, and climate, as well as patterns of land use. Nepal is predominantly mountainous, with elevations ranging from 64 meter above sea level at Kechana in the eastern terai district of Jhapa to 8848 meter at the peak of the world's highest mountain, Sagarmatha with in a span of 200 meter.

Approximately, 600 rivers and rivulets, with a total drainage area of about 194,471 km<sup>2</sup> flow through Nepal; 76% of this drainage area is contained within Nepal. Drainage aea of 33 of Nepal rivers are greater than 1000km<sup>2</sup>.

In keeping with the overall objective of Government of Nepal regarding poverty alleviation, it is envisaged that the living conditions of the Nepali population will be significantly improved in a sustainable manner by the year 2027. The thrust is to be on Integrated Water Resources Development and the targets set for the three core areas of water supply and sanitation, irrigation and electricity are to ensure potable drinking water and adequate sanitation facilities to all the people, round the year irrigation to 90 per cent of the irrigable land in the country and electricity to 60 per cent of the households.

Nepal considers provision of adequate water supply and sanitation to be a high social objective. Strong economic arguments can be made supporting development of water supply and sanitation but opportunities for revenue collection are limited to operation and maintenance costs only and part of capital costs (in the case of urban systems)

The water supply and sanitation coverage at the end of the Ninth Plan has been reported as follows.

	Water Supply Coverage		(Population in 000s)			
	Total		Rural		Urban	
	Benefited	%	Benefited	%	Benefited	%
Eastern	2,917	61	471	70	3,388	62
Central	4,251	65	1,465	85	5,716	69
Western	3,216	79	412	72	3,628	78
Mid-West	2,284	80	168	70	2,452	79
Far-West.	1,719	85	114	46	1,833	81
<b>TOTAL:</b>	<b>14,388</b>	<b>71</b>	<b>2,630</b>	<b>76</b>	<b>17,017</b>	<b>71.6</b>

### Basic Sanitation Coverage

(Population in 000s)

	<b>Rural</b>		<b>Urban</b>		<b>Total</b>	
	No.	%	No.	%	No.	%
Basic Sanitation	4,094	20.0	1,826	53.0	5,920	25.0

A wide range of standards for water supply service level exist. Similar standards have been proposed. These have been tabulated below.

### Water Supply Service Standards:

	<b>High</b>	<b>Medium</b>	<b>Basic</b>
<b>Quantity (lpcd)</b>	112 –150	65	20 – 45
<b>Quality</b>	WHO Standards	National Standards	Potable
<b>Accessibility</b>	Within the house (fully plumbed)	Within the compound (yard tap)	Within 20 mins. Walking distance (standpost supply)
<b>Duration of supply (Hrs./day)</b>	24	24	4
<b>Continuity (months/year)</b>	12	12	12

In the most advanced urban areas the service level is between **basic** and **medium** even where the residences are fully plumbed. Existing systems and service levels are not sustainable due to lack of revenue collection and proper operation and maintenance.

### Sanitation Service Standards

<b>High</b>	<b>Medium</b>	<b>Present Situation</b>	<b>Basic</b>	<b>Nil</b>
At least 70% coverage of sanitary sewers	At least 50% coverage of sanitary sewers	<i>About 30% coverage of sanitary sewers</i>	On-site facilities; (latrines and septic tanks)	No facilities; (open defecation)
Up to 25% on-site facilities	Up to 45% on-site facilities	<i>About 60% on-site facilities</i>	Hygiene awareness	
Less than 5% with no facilities	Less than 5% with no facilities	<i>Some population with no facilities</i>		
Effective sewage treatment	At least primary sewage treatment	<i>Partial hygiene awareness</i>		
Acceptable impacts on receiving waters	Hygiene awareness			

The data present above with respect to the present situation are very rough estimates and are based on the NPC Tenth Plan and the 2001 Census report on sanitation coverage. In the most advanced urban areas sanitation standards must be rated as between **Basic** and **Medium**. Currently wastewater treatment, except for one treatment plant in Guhewswori (Kathmandu), is totally lacking and raw sewage is being discharged directly into natural watercourses. The condition in urban areas is unsatisfactory. The thrust in peri-urban and rural areas is on on-site sanitation and hygiene and health education.

### PROPOSED NATIONAL WATER PLAN TARGETS

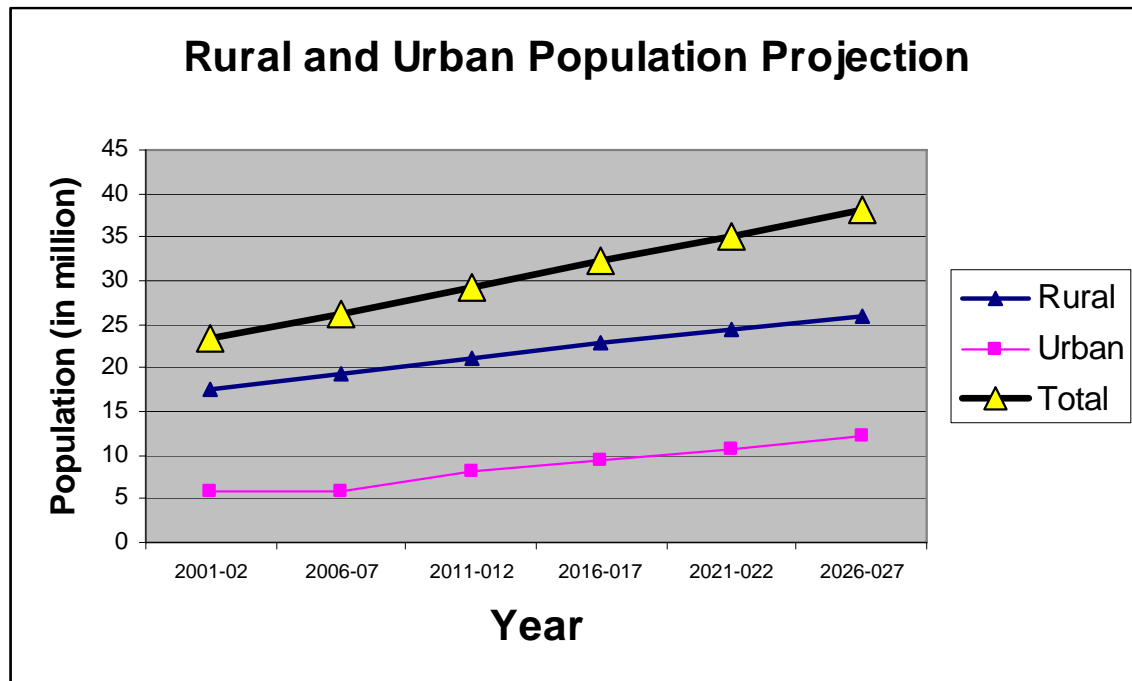
It has been concluded that the NPC/WRS targets with respect to service improvements cannot be met. The required resources – institutional, human and financial – will not be sufficient.

The following targets revised on the basis of the Mid-Term Expenditure Framework (MTEF) and the Millennium Development Goals (MDG) of halving the **un-served** population by the year 2015, are recommended for adoption:

- |                   |   |  |
|-------------------|---|--|
| By 2007           | - | 80% of the total population to have access to water supply                           |
|                   | - | <b>20%</b> of the total population to have medium or high water supply service level |
|                   | - | 40% of the total population to be provided with basic sanitation facilities          |
| By 2012           | - | 90% of the population to have access to water supply                                 |
|                   | - | <b>25%</b> of the total population to have medium or high water supply service level |
|                   | - | <b>65%</b> of the population to have access to basic sanitation facilities           |
| By 2017           | - | 100% of the total population to have access to water supply                          |
|                   | - | <b>30%</b> of the total population to have medium or high water supply service level |
|                   | - | <b>80%</b> of the population to have access to basic sanitation facilities           |
| By 2022           | - | <b>40%</b> of the total population to have medium or high water supply service level |
|                   | - | <b>90%</b> of the population to have access to basic sanitation facilities           |
| By 2027<br>supply | - | 50% of the total population to have medium or high water service level               |
|                   | - | <b>100%</b> of the population to have access to basic standard sanitation facilities |

## EXPECTED POPULATION GROWTH AND DEMOGRAPHIC CHANGES

The rural and urban population projections presented below are based on the WRSF reports.



- The urban population of Nepal is expected to increase by 107% between 2002 and 2027
- The population as a whole is expected to increase by 63% in the same period
- The challenges to be faced in the proposed Water Supply and Sanitation programs are to:
  - increase the extent of coverage
  - increase the level of service
  - simultaneously rehabilitate deteriorating systems
  - establish practices which ensure sustainability of systems
  - meet the needs of increasing sizes of target populations, especially resulting from migration and rapid expansion of urban areas

## MAJOR ISSUES

The following is a summary of the key issues and challenges that need to be urgently addressed in future plans and programs.

- The targets set and the resources made available for the development of the sub-sector have not been consistent.
- A large number of rural WSS schemes are under implementation without adequate budget allocation resulting in long gestation periods. People have not

been assured of timely benefits in proportion to the investments. This indicates a lack of political will and commitment.

- The involvement of multiple agencies has been appreciable but lack of co-ordination amongst them has resulted in duplication of efforts and confusion in some instances.
- Though the sustainability of recently completed WSS schemes has improved considerably with the active involvement of the WUCs, there still exist many older schemes in poor state under the operation and maintenance of the DWSS.
- Due to poor enforcement of the legal provisions to control pollution, the contamination of water sources has considerably increased in the recent past.
- The urban systems are mainly running on operational subsidies due to the non-effectiveness of the cost recovery mechanism and private sector investment has not been forthcoming.
- The management information system has not been effective due to poor co-ordination of efforts.
- Non-formal education, health education and sanitation, and income-generating activities have helped in ensuring the success of the rural sanitation programs but the lack of the desired coordinated efforts amongst the various implementing agencies has minimized the outcomes considerably.
- An increased awareness and motivation on health, hygiene and sanitation is necessary.
- A clear definition and delegation of the appropriate roles, functions and responsibilities of the various agencies right up to the grassroots level is needed.
- Poor regulation and monitoring of the performance of water supply agencies due to the non-existence of effective regulatory bodies.

## **DEVELOPMENT PROGRAMS**

Five programs have been proposed for inclusion in the NWP to meet the objectives of the Drinking Water Supply and Sanitation Strategic Output as follows:

- Rural Water Supply and Sanitation Program
- Kathmandu Valley Water Supply and Sanitation Program
- Small Towns Water Supply and Sanitation Program
- Major Towns Water Supply and Sanitation Program
- Water Supply and Sanitation Institutional Strengthening Program

It need not be over-emphasized that the basis for the development of the above programs has been the key principles and strategies as recommended in the Water resources Strategy Nepal of January 2002. This will be more apparent from the detailed description of the programs contained in the subsequent sections. The major thrust of the five programs is to ensure the sustainability of the proposed projects/programs through the incorporation of the relevant strategic activity/activities as integral parts in each of the programs. Key aspects of the programs are summarized below.

1. Water Supply and Sanitation Institutional Strengthening Program (WSSISP)

- Drafting, enactment and enforcement of MWSSA, Fund Board Act and revisions to DWS regulations
- Clearly defining and delegating roles and functions of key institutions
- Empowering of local bodies through strengthening and capacity building of local bodies
- Drafting, enactment and enforcement of Drinking Water Quality Standards, their monitoring and surveillance
- Improving database and MIS for better monitoring and evaluation of projects plus dissemination of information
- Integrating capacity building with national sanitation and environmental sanitation campaigns, community based hygiene and environmental sanitation support and school sanitation and hygiene education activities in the DACAW districts ultimately covering all the 75 districts
- Formation/Capacity building of NWSRB
- NGO and private sector mobilization
- Adopting effective water source conservation and protection measures at the sub-project level
- Monitoring and evaluation of the programs at various levels

## 2. Rural Water Supply and Sanitation Program (RWSSP)

- Adoption of the WASH program – water, sanitation and hygiene - Additional population served – 11,582,000
- Convergence of different modalities and consolidation by the end of the Eleventh Plan – a District Rural Water Supply and Sanitation Development Fund (DRWSSDF) to be created with contributions from all development partners, HMG, DDCs and VDCs and made operative
- All implementing agencies eligible for financial assistance from the DRWSSDF provided they satisfy a minimum set of criteria
- Only demand-driven projects to be considered with a minimum of 20% contribution from the community in cash or kind of which 1% should be in cash
- O&M cost to be fully met by the community. An O&M Fund to be established with up-front contribution from the community
- From equity considerations, a pro-poor strategy for the disadvantaged groups will be adopted with community contribution reduced to 10%
- Capacity building at the grass-root level, gender sensitization, non-formal education and income-generation activities to be integrated

## 3. Small Towns Water Supply and Sanitation Program (STWSSP)

- Around 500 emerging towns with a total population of approximately million will be covered and have access to WS of medium service level – additional population served 7,206,000.
- Majority of these towns will have proper sewerage systems in the core areas with on-site sanitation in the remaining areas

- Under the MWSA, municipalities will be required to take over the WSS systems under a concession agreement to be regulated by the NWSRB.
- Municipalities/WUCs will be fully empowered and their capacity built to provide services efficiently, besides owning the assets on behalf of the communities
- Full O&M cost recovery in the interim leading to partial capital cost recovery within an agreed period as set out in the concession agreement

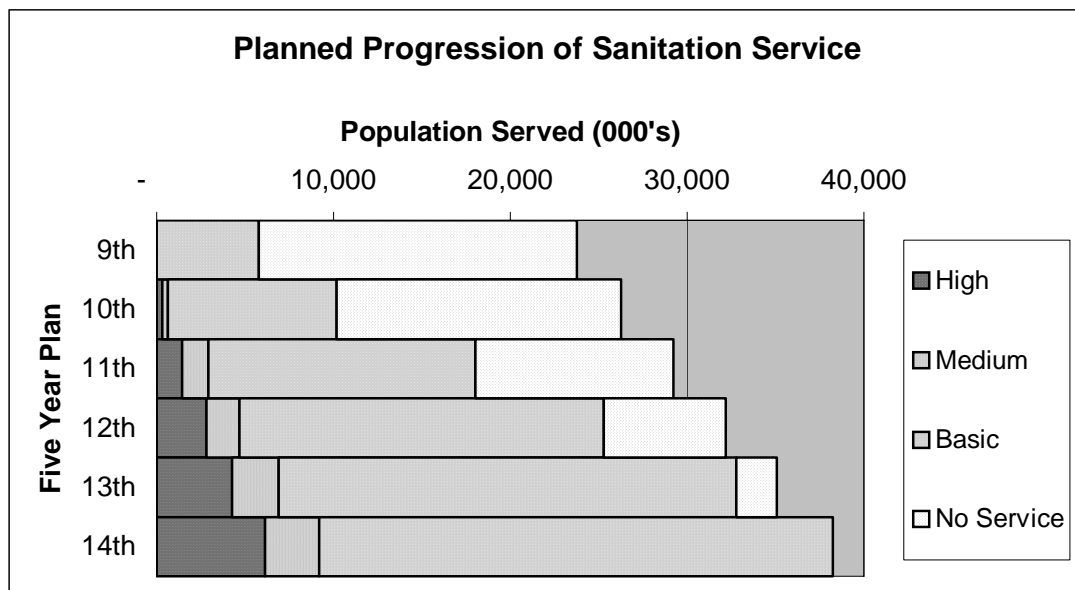
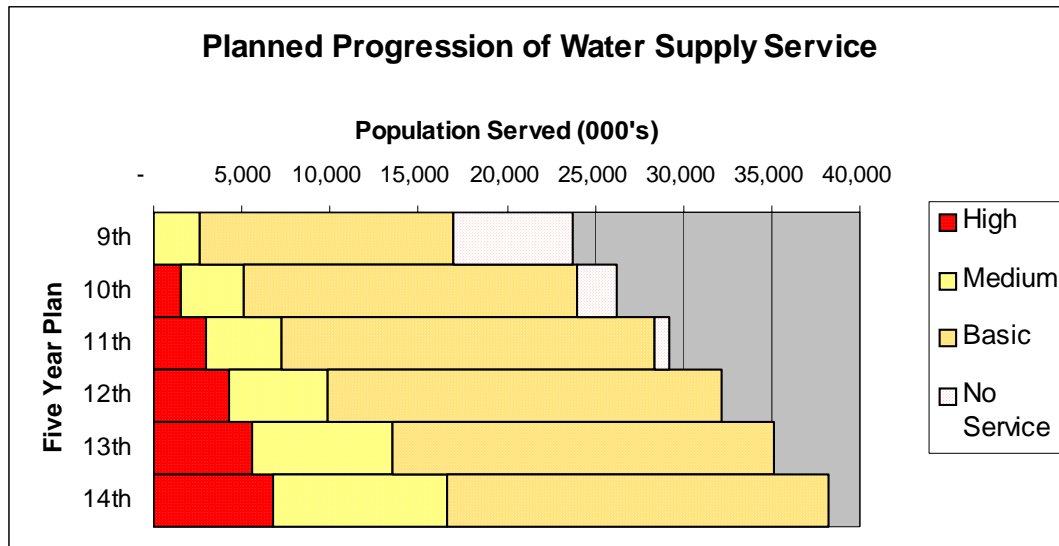
4. Kathmandu Valley Water Supply and Sanitation Program (KVWSSP)

- Melamchi Water Supply Project to be commissioned by 2008/2010  
Additional population served – 1,553,000
- Management and operation to be contracted out to a private operator under a management contract in the short-term to be subsequently converted to a lease contract and finally into a concession
- Municipal Water Supply Services Act (MWSSA) to be enacted and enforced
- Kathmandu Valley Water Supply Authority and National Water Supply Regulatory Board (NWSRB) to be established and made fully operative
- O&M cost only to be recovered in the interim period and partial capital cost recovery (50%)
- Cleaning up the water-courses in the Valley through a phased wastewater system improvement and treatment leading up to separate sanitary and storm water sewerage systems

5. Major Towns Water Supply and Sanitation Program (MTWSSP)

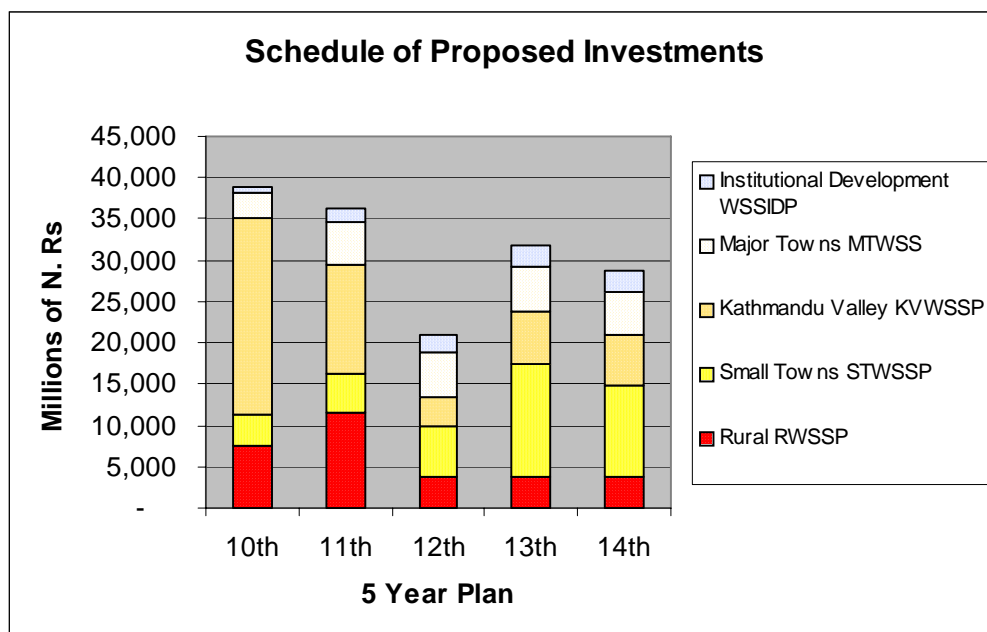
- 50 of the larger municipalities which are expected to be ultimately upgraded to metropolitan/sub-metropolitan cities to be provided with WS of high service level – additional population covered 5,235,000
- Under the MWSA, municipalities will be required to take over the WSS systems under a concession agreement to be regulated by the NWSRB
- Municipalities will be fully empowered and their capacity built to undertake the services efficiently
- Full O&M cost recovery in the interim leading to financial equilibrium and full cost recovery within an agreed period as set out in the concession agreement
- Works envisaged under the program are:
  - Rehabilitation of existing WS system
  - Construction of new WS systems
  - Cleaning, rehabilitation and extension of existing sewerage systems
  - Installation of new sewerage systems in the core areas and promotion of on-site sanitation in the remaining areas
  - Solid waste management activities
  - Community development and poverty alleviation activities

The coverage has been shown graphically below.



## SCHEDULE OF PROPOSED INVESTMENTS

The summary of estimated program costs is as follows:



A very large part of the planned national investment will be directed to the Kathmandu Valley water supply program in the 10<sup>th</sup> and 11<sup>th</sup> Five-Year Plans.

### **ECONOMIC AND FINANCIAL RETURNS**

Economic and financial returns from water supply and sanitation projects are shown to be positive. In recent project analyses the performance indices were calculated as

Economic Internal Rate of Return	from 10% to 36%
Financial Internal Rate of Return	from 0.4% to 7.8%
Benefit/Cost Ratio	from 1 to 2

### **SOCIAL AND ENVIRONMENTAL DIMENSIONS**

The water supply and sanitation programs are expected to have significant positive social impacts through:

- improved public health
- labor savings
- benefits to women and children following from accompanying gender and social development programs

The overall sanitation programs address the serious environmental issue of urban water quality. Proper construction of water supply facilities and water source protection will foster sustainable use of water for water supply.

### **PRIORITIZATION OF WATER SUPPLY AND SANITATION ACTIONS**

The following is a summary of criteria used for setting priorities among projects in the five principal water supply and sanitation programs:

	Rural RWSSP	Small Towns STWSSP	Major Towns MTWSS	Kathmand u Valley KVVWSSP	Institutional Development WSSIDP
Remoteness of location	Y	Y			
Percentage of disadvantaged groups	Y				
Poverty incidence and average income levels		Y	Y		
Historically underdeveloped areas	Y				
Rating on the Human Development Index (HDI)	Y				Y
Average time spent fetching water		Y	Y		
Incidence of diarrhea diseases	Y				
Drinking water quality monitoring and surveillance					Y
Existing coverage by functioning facilities					
Water Supply	Y	Y	Y		Y
Sanitation	Y	Y	Y		Y
Quality of existing facilities		Y	Y		
Existence of town structure/area development plan		Y	Y		
Willingness and ability to pay for improved services	Y	Y	Y		
UIEP towns			Y		
NWSC major towns			Y		

\*Based On National Water Plan ,Nepal.