Sector Development Plan
(FY 2011-25)

Water Supply and Sanitation Sector in Bangladesh

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November 2011

Local Government Division
Ministry of Local Government, Rural Development and Cooperatives
Government of the People's Republic of Bangladesh

Minister
Ministry of Local Government,
Rural Development and Cooperatives
Government of the People's Republic of Bangladesh

MESSAGE

I am delighted that the Policy Support Unit (PSU) of the Local Government Division (LGD) has prepared the 'Sector Development Plan (FY2011-25) for the Water and Sanitation Sector in Bangladesh'.

The Sector Development Plan (SDP) is a path-breaking initiative spearheaded by the LGD to sketch a bottom-up road map to achieve the goal of providing safe drinking water and sanitation for all by 2011 and 2013 respectively. This goal was enshrined in the 2008 election manifesto of our party and subsequently reflected in various national policy, strategy and planning documents, including the National Strategy for Accelerated Poverty Reduction II (Revised) FY 2009-11 Step Towards Change, Perspective Plan for Bangladesh, and Vision 2021.

I am pleased that the Plan has grown out of a highly participatory process involving a large variety of stakeholders from the grassroots to the policy level, and deepened a sense of shared ownership. The process led to the formation of 12 thematic groups, which have volunteered to contribute to the SDP implementation to be coordinated by the National Forum of Water Supply and Sanitation (NFWSS). It is encouraging that this trend-setting participatory approach by the SDP is in line with the government's overall aim of achieving good governance that will foster adoption of transparency and accountability principles.

While we have achieved significant progress in delivering water and sanitation services, our government remains sensitive to the demand which is increasing day by day. Despite the constraints facing the sector, we would enhance our institutional capacities to step up the process of implementing the SDP and thereby serving our people, particularly the disadvantaged, vulnerable and the excluded sections of the society, such as the hardcore poor, the women, the children and the physically challenged people.

Further, in recognition of the importance of this sector, the government has nearly doubled its budgetary allocation in FY 2010-2011 compared to that for FY 2008-09, and we hope to continue this pattern in the future as well. Towards this end, I note that implementation of the SDP would require additional allocations and that the finance gap of about Taka 21,000 crore, estimated by the SDP, could be made up with 50 percent additional allocation from the government and another 50 percent from the development partners.

I endorse the SDP's key message that it should be the overarching planning document and the basis for formulating sector investment plans. Accordingly, I call upon all stakeholders, including the government and non-government organizations, to follow the SDP in their respective plans.

I am hopeful that our collective commitment and concerted efforts would enable us to ensure sustainable delivery of water and sanitation services for all. I look forward to the successful implementation of this valued long-term plan by the Government of Bangladesh.
Long live Bangladesh !

Syed Ashraful Islam, M.P

Minister
Ministry of Local Government,
Rural Development and Cooperatives
Government of the People's Republic of Bangladesh

MESSAGE

I am glad that the Policy Support Unit (PSU) of the Local Government Division (LGD) has prepared the Sector Development Plan (FY2011-2025) for the Water and Sanitation Sector in Bangladesh involving a variety of stakeholders representing the governmental, non-governmental and private organizations and agencies. The wider participation of the stakeholders ranging from grassroots to the policy level in making a sector development plan of the government creates a unique example to follow, as we know participation is a major step towards establishing good governance.

I take special interest to note that the Sector Development Plan (SDP) is the first planning document of its kind that has been developed in a bottom-up approach articulating the grassroots priorities and tailoring them craftily to realize the government's commitments to providing water for all by 2011 and sanitation for all by 2013 as well as the basic services projected in Vision 2021. I beleive that this dream, as propounded by Honorable Prime Minister, Deshratna Jananatry Sheikh Hasina, would be translated into actions by different implementing agencies under the leadership of Local Government Division, Ministry of Local Government, Rural Development and Co-operatives.

I am happy that the progress we have made in reaching the goals of water and sanitation for all is significant. However, we must acknowledge that we are yet to fully reach out to the hard-to-reach areas, such as the Chittagong Hill Tracts (CHTs), haors-baors and beels, coastal islands, chars and offshore islands. Also, we are yet to fully create viable service opportunities for the poor women and men living in the urban slums and squatter settlements. Further, it is becoming a matter of concern for the coastal people to access safe drinking water due to increase in salinity in groundwater and surface water. Generally, the groundwater level is declining, which is limiting our access to safe water in a cost effective manner. Therefore, it is imperative that we devise more innovative technologies, such as disaster-resilient technologies in the affected areas, by investing more in research and development.

We are aware that our institutional and financial capacity is still limited to create more viable options. Nonetheless, despite our limitations, our government remains committed to dealing with these challenges by allocating more resources to the sector and enhancing management capacity as per the investment plan of the SDP.

I would like to request all concerned to cooperate with the LGD in implementing the SDP.

Joy Bangla, Joy Bangabandhu,
Bangladesh Chirojibi Hoke.

Advocate Jahangir Kabir Nanak, M.P

Secretary
Local Government Division
Ministry of Local Government,
Rural Development and Cooperatives
Government of the People's Republic of Bangladesh

PREFACE

Providing sustainable water and sanitation services for all remains a huge challenge in Bangladesh. Although the water supply coverage increased significantly from nearly 10 percent in the early days of our independence to almost universal - 97 percent - in the early 90's, it dropped down to 74 percent due to the detection of arsenic contamination in groundwater. While we have been making efforts to ameliorate the situation by initiating various interventions on the ground, as per the recent study conducted by DPHE-JICA there are about 200 unions having only 20 percent water coverage, and more than 80 percent water sources are contaminated. We fully recognize that the challenging task ahead of us requires further urgent interventions. However, I am happy that the SDP has analyzed all these strategic issues for our future interventions and subsequent investment, on the basis of which the Government of Bangladesh and the development partners would make decisions on their involvement in the sector.

It does not go unnoticed that the problem of water source management and the alternative source of surface water for drinking purposes is going from bad to worse to our utter dismay. The groundwater level of Dhaka city is going down at a rate of about three meters per year, deepening the present crisis of non-availability of supply water in some parts of the city in dry season. It is alarming to us as the policymakers and the managers of services. Moreover, our urban centers are growing rapidly with people migrating to the city, but we have limited piped water supply coverage in those areas. The sanitation systems, including sewerage and drainage in the urban areas, are also inadequate and in some cases inappropriate. The operation and the maintenance of the existing facilities are inefficient causing huge revenue losses. Rural water supply also faces a host of problems including the lack of appropriate solutions with regard to the hard-to-reach areas. Further, the improvement in sanitation of rural areas is difficult due to a lack of sustained use of latrines and hygiene practices. I am happy to note that the 'Sector Development Plan (FY 2011 – 2025) for Water and Sanitation Sector in Bangladesh' has already captured these technical and operational issues and has come up with plausible solutions.

It keeps me enthusiastic in seeing that the SDP has included the major challenges that the sector is facing at this moment. It analyzes the issues of donor harmonization, alignment of the WSS programs with government policies and principles, and adopting sector-wide approaches (SWAp), which seems simple to read but difficult to implement. Besides, the SDP spells out investment requirements divided into three major strategic timeframes (i.e. short-term, medium-term, and long-term), which is aligned with the government planning systems. For reasons of conformity with broader national planning, the SDP was consulted with the Planning Commission to feed its views into the government's 15-year Perspective Plan. It has been reflective of the government's political commitment and international pledges, for example Vision 2021 and the MDGs. In terms of funding requirements, the SDP is realistic, as it shows possible access to public, development partners and private funding sources over time. The overall progress of the sector services is also linked with the gradual inclusion of institutional and financial improvements, and sector-wide approaches.

I would like to add that the SDP has widened the opportunities for the sector agencies like the WASAs, city corporations and the paurashavas to increase their service coverage. The SDP process has also broadened DPHE's scope to take the lead role in making all the 12 thematic groups more vibrant and to remain responsive to the emerging technical and social needs and demands of the sector. The immediate task for the PSU would be to provide support to the relevant agencies for making their plans in line with the road-map for implementing the SDP. I would like to request all respective agencies to establish a focal point for SDP implementation so that the LGD can maintain regular communication with them.

While going through the set of action points that the SDP recommends, I find them very pragmatic and doable as well. In a nut-shell, it lays emphasis on institutional and legal reforms, strengthening the capacities of the public institutions, establishing a better sector coordination and monitoring system, managing the water resources effectively, stimulating the private sector, safeguarding the environment and tackling the climate change, increasing fund, and above all expanding coverage, increasing service levels, and ensuring sustainability. These are all hugely important for the sector, but what we need urgently is to address in future the programming in the sector. And I call upon the relevant departments, the agencies, the NGOs, the private sector, and the development partners to take these into account.

I thank my colleagues of the Local Government Division (LGD), especially the Joint Secretary (Water Supply) and the Deputy Secretary (Water Supply) for their proactive roles and continued support. I also thank my colleagues working with the Policy Support Unit (PSU) for their relentless efforts at managing the uphill task of SDP preparation and presenting it to the nation. I must make a particular mention of the valuable contribution, praiseworthy dedication and excellent leadership of the Project Director, Policy Support Unit (PSU). Indeed, he has demonstrated all such attributes through the trajectory of the SDP preparation and its dissemination.

Finally, I take the privilege of introducing the SDP to all stakeholders, hoping that all our endeavors will succeed eventually in effectively implementing the Plan

Abu Alam Md. Shahid Khan

FOREWORD

The Sector Development Plan (FY 2011-25) for the Water and Sanitation Sector in Bangladesh took an extensive, participatory and analytical approach at the national and local levels to provide a framework for planning, implementing, coordinating and monitoring all activities in the Water Supply and Sanitation sector. The exercise covered a wide range of consultations with the stakeholders, comprising, among others, development partners, various ministries and other relevant functionaries, different local government institutions, the Chittagong Hill Tracts (CHTs) regional and district councils, public and private service providers, community and individual level users, policy makers, sector professionals and academia. This approach is indeed commendable, as it results from a holistic process of stakeholder participation, consultation and involvement.

The most pertinent element of the SDP is the presentation of progressive development of water supply and sanitation services during the Plan's three strategic timeframes: short-term, medium-term, and long-term. This development of services is linked to the performance of the sector based on achievement of various milestones during each of the three timeframes.

The SDP has addressed various issues related to sector financing, planning and coordination mechanisms, and monitoring and evaluation. It includes the needs of the people of the CHTs and other hard-to-reach areas. For institutional strengthening, the SDP recommends necessary reforms, and enhancing the Research and Development (R&D) activities to support innovating technological solutions, and to promote demand responsiveness of the service providing agencies.

There are massive challenges facing the sector. One such challenge that needs to be dealt with a huge financial gap that is needed to implement the SDP as planned. In addition, the PSU will have to ensure sector coordination, MIS, monitoring and evaluation in conformity with Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) and the Joint Monitoring Program (JMP). We will also have to face another challenge of making the Policy and Monitoring Committee and the Technical Committee functional under the leadership of the National Forum for Water Supply and Sanitation (NFWSS). Yet, I am confident that, with the commitment and support of all relevant members, the proposed institutional framework for the sector led by the Forum will function effectively and efficiently.

To sum up, I would like to express my gratitude to the stakeholders of the sector, including the development partners, who have rendered valuable inputs and support in the process of the SDP preparation. I also thank my colleagues in the ministry, for making important contributions. Further, we are thankful indeed to the consultants for their sincere efforts at producing an excellent piece of work.

Finally, I greatly appreciate the tremendous efffors of thePolicy Support Unit (PSU) and its officials have demonstrated at all levels to keep the boat sailing all the way under the dynamic and worthy leadership of the Unit's Project Director of Policy Support Unit. I thank them all because they have made it possible to present the SDP to the country.

Zuena Aziz
Joint Secretary (Water Supply)
Local Government Division

ACKNOWLEDGEMENT

The Sector Development Plan (FY 2011-25) is a homegrown planning document. It has grown in an all-inclusive process which has eventually developed into a commitment-generating platform. The platform has mobilized all stakeholders on board and enabled them to participate effectively in the sector reform process and contribute to the formulation of various actions points for the Plan.

I recall that the preparation of the SDP had faced enormous challenges which we had been able to overcome successfully with the continuous support and commitment obtained from the respective ministries and the government departments, development partners, UN agencies and the NGOs. I sincerely acknowledge the contributions of all stakeholders, including the community and individual users at the local levels, who graciously gave their time and provided valuable insights and suggestions. Nonetheless, the major challenge lies in the satisfactory implementation of the SDP with the assistance of 12 thematic groups under the leadership of the policy and technical committees. However, I am pleased to report that the SDP is already being used in various analyses of the sector and the implementation of some sections of the SDP has been initiated. A case in point is the pilot implementation of the Water Safety Plan technically supported by the World Health Organization.

While it would be difficult to mention the contributions of all by name, yet, it would be generous to recognize a few who lent critical support to the SDP preparation. The SDP is born out of the tireless efforts made by a team of consultants Dr. Tanveer Ahsan, Team Leader; Mr. Imtiaz Ahmad, Member; Mr. Md. Abul Kashem, Member; and Mr. A. Quader Chowdhury, Member, SDP Preparation Team. While preparing the Plan, they have always been very accommodative of changes, flexible to incorporation of suggestions and innovations, and committed to maintaining the quality of the output.

The SDP is the first planning document that has been peer-reviewed by the scholars and experts, namely Dr. Ainun Nishat, Vice Chancellor, BRAC University (BRACU); Mr. Feroze Ahmed, Professor, Civil/Environmental Engineering Department, BUET; Dr. Md. Mujibur Rahman, Professor, Civil/Environmental Engineering Department, BUET; Mr. Habibur Rahman, Pro-Vice Chancellor, BUET; Mr. S M Ihtishamul Huq, Superintendent Engineer, DPHE; Mr. Shamsul Gafur Mahmud, National Professional Officer, World Health Organization (WHO); Mr. Hans Spruijt, Chief, WES Section, UNICEF Bangladesh; Mr. Rafiqul Islam, Senior Project Implementation Officer, ADB Bangladesh Resident Mission; Mr. S. M. A. Rashid, Executive Director, NGO Forum for DWSS; Mr. Kazuyuki Suenaga, Arsenic Mitigation Technical Advisor, JICA; Mr. Mark Ellery, Head of WSP, The World Bank, Dhaka Office and Dr. Md. Khairul Islam, Country Representative, WaterAid-Bangladesh. I am expressing my gratitude to all of them that they have made it convenient to ensure and enrich the quality of the product. I again thank Mr. Mark Ellery for being the Official Editor of the SDP. The member organizations and agencies of the 12 thematic groups have provided critical inputs in course of the SDP preparation and are committed to its implementation. I thank them all for their valuable contribution to the process.

I express my gratitude to Mr. Abu Alam Md. Shahid Khan, Secretary, LGD, who kindly shouldered the responsibility for completing the halfway task and demonstrated his extraordinary leadership in retaining the momentum. I also express my gratitude to his predecessor Mr. Monzur Hossain, Secretary, Ministry of Home Affairs, who has always been a source of inspiration, who remained with us in the five major workshops, and who facilitated building consensus among the stakeholders. I am thankful to Ms. Zuena Aziz, Joint Secretary (Water Supply), LGD for her critical guidance. I am also thankful to Mr. Shahjahan Ali Mollah, former Joint Secretary (Water Supply); Mr. Shams Uddin Ahmed, Deputy Secretary (Water Supply), LGD and Mr. Sarwar Bari, Senior Assistant Secretary and Private Secretary to Honorable Secretary, LGD who have always cooperated with us and played important roles in many different ways.

I am grateful to Mr. Jan Moller Hansen, Deputy Head of Mission, Embassy of Denmark who has mobilized financial support as well as created space for the SDP to be more inclusive.

I thank Mr. Nuruzzaman, Chief Engineer, DPHE, who had been instrumental in mobilizing technical expertise from the DPHE and reaching consensus. Mr. Taqsem A. Khan, Managing Director, Dhaka WASA; Mr. A.K.M. Fazlullah, Managing Director, Chittagong WASA; Mr. Muhammad Rezaul Islam, Managing Director, Rajshahi WASA; Mr. Md. Abdullah, Managing Director, Khulna WASA; Mr. Liakot Ali, Deputy Managing Director, Dhaka WASA; played leadership and expert roles in increasing service coverage and ensuring its quality. I thank them all.

I am thankful to Mr. Swapan Kumar Sarkar, Director General, MIE Wing, LGD; Mr. Md. Abdul Malek, Joint Secretary (Dev), LGD; Mr. Ashoke Madhob Roy, Joint Secretary and Private Secretary to Honorbale Minister for LGRD&C; Mr. Abu Bakr Siddique, Chief, Physical Planning and Infrastructure Division, Planning Commission; Mr. S.M. Zahir Khan, Joint Chief, Physical Planning, Planning Commission; Mr. Ansar Ali Khan, Deputy Secretary (Dev.), LGD; Mr. Matinul Haque, Deputy Secretary (WS-3), LGD; Mr. Aktar Hossain, Deputy Secretary (Admin), LGD; Mr. Khaja Miah, Deputy Secretary (WS-1), LGD; Mr. Mizanul Haque Chawdhury, Deputy Secretary (WS-3), LGD; Mr. Abdul Quashem, Deputy Secretary, Ministry of Water Resources; Mr. Anwar Hossain Hawlader, Deputy Secretary, LGD; Mr. Sudhir Kumar Ghosh, Superintending Engineer (Ground Water Division), DPHE; Mr. Amin Sharif, Senior Assistant Chief (Planning), and Private Secretary to Honorable State Minister, LGRD&C; Mr. Harunur Rashid, Senior Assistant Secretary, LGD; Mr. Noor-e-Alam, Assistant Chief, Planning Commission; Mr. Zahidul Anam Khan, Senior Assistant Chief, Planning Commission; Ms. Syeda Salma Zafreen, Senior Assistant Secretary (WS-2), LGD; Mr. Ali Akbar, Senior Assistant Secretary, LGD; Mr. Ali Ahmed, Project Director, UPPR Project; Mr. Azahar Ali, National Project Coordinator, UPPR Project; Mr. Sk. Abu Jafar Shamsuddin, Center Manager, ITN-BUET; Mr. AKM Ibrahim, Superintending Engineer, DPHE; Dr. Enamul Kabir, MD, HYSAWA FMO; Dr. Niaz Chowdhury, Program Officer, Water and Sanitation, Embassy of Denmark; Mr. M. Akhtaruzzaman, Country Team Leader, WSP-SA World Bank; Mr. Abdul Motaleb, Senior WS Specialist, WSP-World Bank; Mr. Santanu Lahiri, Senior Water and Sanitation Specialist, WSP-World Bank; Ms. Rokeya Ahmed, Water and Sanitation Specialist, WSP-World Bank; Mr. Delwar Hossain, ADB Consultant; Mr. Md. Yakub Hossain, Deputy Executive Director, VERC; Dr. Yan Zheng, WES specialist, Mr. Lalit Mohan Patra, WES Specialist, Ms. Mohsina Islam, Institution Development Specialist, Unicef; and Mr. Ranajit Das, Senior Project Coordinator, DSK for their advice and all-out support and cooperation. Thanks are due to Dr. Dibalok Singha, Executive Director, DSK and late Dr. Syed Ishteaque Ali Jinnah, former Director – Policy and Advocacy, WaterAid Bangladesh; who had been instrumental in mobilizing the civic organizations to feed their voices into the document.

I am very thankful to Mr. Jyotirindra Bodhipriya Larma, Chairman, Chittagong Hill Tracts Regional Council, for his kind cooperation and cordial support for assessing the special needs and priorities of the CHTs in water supply and sanitation sector. I also thank Advocate Azmatullah, Mayor, Tongi Pourashava, and Chairman, Municipal Association of Bangladesh (MAB); Mr. Shamim Al Razi, Mayor, Singra Pourashava, and Secretary, MAB; and Abdul Baten, Mayor, Bera Paurashava and Vice-Chairman, MAB; who played important roles in mobilizing the elected officials of the paurashavas in enlarging the service networks and reducing the system loss. Thanks are due to the representatives of all city corporations, who remained cooperative all through in reforming the WSS polices.

I would like to thank former Project Director Mr. Waliul Islam, Project Director Kazi Abdul Noor, Senior Adviser Dr. Guna N. Paudyal, Quazi Avizit Reaz and their colleagues of the GoB-Danida HYSAWA Project for their warm cooperation and sincere efforts. I would like to thank the WSSPS-II officials including Mr. Alok Majumder, Ms. Farzana Nasrin, Ms Fatema Khatun, and Mr. Anthony Gomes, for their warm support for our work.

I would like to thank all of my PSU colleagues. In particular, I would like to express my appreciation to Mr. Poul-Erik Frederiksen and Mr. Shajahan Ali for their commitment and high quality technical advice. My other colleagues, Mr. Torsten Malmdorf, Md. Naziruzzaman and Mr. ABM Ziaul Kabir aslo deserve special thanks. Futher, I thank Mr. Edwin Ranjan Hira, Mr. Rubel Shankar Biswas, Mr. Ashfaq E Zaman, Mr. Md. Mozaffar Hossain, Mr. Md. Zakir Hossain, Mr. Md. Rezaul Islam, Mr. Md. Ahmedul Haque, Mr. Md. Yousuf Hawladar, Mr. Shyamal Chandra Saha, Mr. Montu Costa and Mr. Masum Khan for their hard work and sincere cooperation. I also thank Mr. Bayezid Dawla, Mr. Ashutosh Dey and Mr. Nurul Haque Asheem, Consultants for their inputs.

Finally, I sincerely hope that the team effort would continue during the SDP implementation phases.

Md. Shariful Alam
Project Director (Deputy Secretary)
Policy Support Unit (PSU)
Local Government Division

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List of Acronyms and Abbreviations

ADB	Asian Development Bank
ADP	Annual Development Program
APSU	Arsenic Policy Support Unit
AusAID	Australian Agency for International Development
BADC	Bangladesh Agricultural Development Corporation
BAMWSP	Bangladesh Arsenic Mitigation Water Supply Project
BBS	Bangladesh Bureau of Statistics
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
CCEDM	Climate Change, Environment and Disaster Management
BCSIR	Bangladesh Council of Scientific and Industrial Research
BDT	Bangladesh Taka
BMDA	Barind Multipurpose Development Authority
BOO	Build Operate Own
BPSIG	Bangladesh Private Sector Infrastructure Guidelines
BRGM	Bureau de Recherches Géologiques et Minières
BSTI	Bangladesh Standards and Testing Institution
BTO	Build Operate Transfer
BUET	Bangladesh University of Engineering and Technology
BWDB	Bangladesh Water Development Board
CBO	Community Based Organization
CDC	Community Development Center
CHT	Chittagong Hill Tracts
CIDA	Canadian International Development Agency
CIS	Commonwealth of Independent States
CLTS	Community-Led Total Sanitation
DALY	Disability-Adjusted Life-Years
DANIDA	Danish International Development Assistance
DFID	Department for International Development
DGHS	Directorate General of Health Services
DMA	District Metered Area
DMC	Disaster Management Committee
DMB	Disaster Management Bureau
DOE	Department of Environment
DP	Development Partner
DPE	Directorate of Primary Education
DPHE	Department of Public Health Engineering
DRR	Directorate of Relief and Rehabilitation
DSK	Dushtha Shasthya Kendra
DSP	Deep Set Pump
DWASA	Dhaka Water Supply and Sewerage Authority
ERD	External Resource Division
FDI	Foreign Direct Investment
FGD	Focused Group Discussion
FY	Financial Year

GDP	Gross Domestic Product
GoB	Government of Bangladesh
GPS	Government Primary School
GSB	Geological Survey of Bangladesh
HDC	Hill District Council
HIES	Household Income and Expenditure Survey
HLP	Horizontal Learning Program
HNPSP	Health, Nutrition and Population Sector Program
HPSP	Health and Population Sector Program
HYSAWA	Hygiene, Sanitation and Water Supply
IEC	Information, Education and Communication
IG	Infiltration Gallery
IIFC	Infrastructure Investment Facilitation Center
IMDMCC	Inter-Ministerial Disaster Management Co-ordination Committee
IPAM	Implementation Plan for Arsenic Mitigation
IPCC	Inter-Governmental Panel on Climate Change
IP-WS	Implementation Plan for Water Supply
IRP	Iron Removal Plant
ITN	International Training Network
JICA	Japan International Cooperation Agency
JMP	Joint Monitoring Program
KII	Key Informant Interview
KSA	Knowledge, Skill and Attitude
LCG	Local Consultative Group
LGD	Local Government Division
LGED	Local Government Engineering Department
LGI	Local Government Institution
LGSP	Local Governance Support Project
lpcd	liters per capita per day
LSHTP	London School of Hygiene and Tropical Medicine
m	meter
m^3	cubic meter
µg/l	microgram per liter
mg/l	milligram per liter
MGD	Millennium Development Goal
MICS	Multiple Indicator Cluster Survey
MLGRD&C	Ministry of Local Government, Rural Development and Co-operatives
MIS	Management Information System
ml	milliliter
mm	millimeter
MoEF	Ministry of Environment and Forest
MoFDM	Ministry of Food and Disaster Management
MoHFW	Ministry of Health and Family Welfare
MoPME	Ministry of Primary and Mass Education
MoU	Memorandum of Understanding
MoWR	Ministry of Water Resources

MTBF	Medium Term Budget Framework
NAPA	National Program of Adaptation
NAMIC	National Arsenic Mitigation Information Center
NAMIP	National Policy for Arsenic Mitigation & Implementation Plan
NDMC	National Disaster Management Council
NFWSS	National Forum for Water Supply and Sanitation
NGO	Nongovernmental Organization
NHS	National Hydro-chemical Survey
NIGL	National Institute for Local Government
NIPORT	National Institute of Population Research and Training
NOC	No Objection Certificate
NPDM	National Plan for Disaster Management
NPSWSS	National Policy for Safe Water Supply and Sanitation
NSAPR	National Strategy for Accelerated Poverty Reduction
NSS	National Sanitation Strategy
NWP	National Water Policy
NWMP	National Water Management Plan
ODF	open defecation free
OECD	Organization for Economic Co-operation and Development
O&M	operation and maintenance
ORT	Oral Re-hydration Therapy
PEDP	Primary Education Development Program
PICOM	Private Infrastructure Committee
ppb	parts per billion
PPP	Public Private Partnership
PPSWSS	Pro-Poor Strategy for Water and Sanitation Sector
PRSP	Poverty Reduction Strategy Paper
PSU	Policy Support Unit
PSF	pond sand filter
PWSS	Paurashava Water Supply Section
RAAMO	Risk Assessment of Arsenic Mitigation Options
RC	Regional Council
R&D	Research and Development
RDA	Rural Development Academy
RHS	rainwater harvesting systems
RNGPS	Registered Non-Government Primary School
SAARC	South Asian Association for Regional Cooperation
SACOSAN	South Asian Conference on Sanitation
SDF	Sector Development Framework
SDP	Sector Development Plan
SHEWA-B	Sanitation, Hygiene Education and Water Supply in Bangladesh
SIP	Sector Investment Plan
SIS	Sector Information System
SOD	Standing Orders on Disaster
SOP	Standard Operating Procedure
SST	Shallow Shrouded Tubewell

sq km	square kilometer
SWAp	Sector Wide Approach
TLCC	Town Level Coordination Committee
TPP	Tripartite Partnership
UDD	Urban Development Directorate
UfW	Unaccounted for Water
UN	United Nations
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
VERC	Village Education Resource Center
VIP	ventilated improved pit
VSST	Very Shallow Shrouded Tubewell
WARPO	Water Resources Planning Organization
WASA	Water Supply and Sewerage Authority
WASH	Water, Sanitation and Hygiene
WATSAN	Water and Sanitation
WC	Water Cell
WHO	World Health Organization
WEDC	Water, Engineering and Development Centre
WRC	Water Supply regulatory Commission
WSP	Water Safety Plan
WSP	Water and Sanitation Program
WSS	Water Supply and Sanitation

Chapter 1

INTRODUCTION

This chapter provides a background of the Sector Development Plan (SDP), briefly narrates the country and water supply and sanitation (WSS) sector context and explains the existing Sector Development Framework consisting of legal instruments, policies, strategies and plan. Next, the objective and the scope of the SDP and the planning periods are described. The approach and methodology, including the participation of the sector partners, are then discussed. The chapter ends with an outline of the layout of this document.

1.1 Background

In 2005, the Local Government Division (LGD), Ministry of Local Government, Rural Development and Cooperatives (MoLGRD&C) prepared a 10-year SDP (SDP, 2005) for the WSS sector in Bangladesh. The SDP 2005 analyzed the relevant national and international policies, strategies and targets, and prepared a framework for the development of the WSS sector. The SDP 2005 was used as a planning document for the WSS sector by the Government of Bangladesh (GoB) and the Development Partners (DPs).[1,2] The government subsequently decided that a separate analysis for Chittagong Hill Tracts (CHT), more focus on hygiene promotion and greater attention to regions that were lagging behind should be included. It was also realized that some emerging development approaches such as the Water Safety Plan (WSP), Sector Wide Approach (SWAp), and climate change and disaster management should be assessed and incorporated in the context of the WSS sector.

Accordingly, the Policy Support Unit (PSU), under the LGD, initiated preparing the next version of the SDP 2005.[3] This document uses the term "SDP" to mean the new Sector Development Plan for a period of 15 years from Financial Year[4] 2010-11 (FY 2011) to FY 2025.

1.2 Country Context

1.2.1 Administrative, Economic and Social Profile

Bangladesh, with an area of 147,570 square kilometers (sq km) and an estimated population of 150 million in 2010, is one of the most densely populated countries in the world. For administrative purposes, Bangladesh is divided into seven divisions. The divisions are subdivided into 64 districts, the districts into 482 upazilas (sub-districts) and the upazilas into 4,498 unions (the lowest tier). In the

[1] Asian Development Bank (ADB), 2009, Reference Number: SAP: BAN 2009-02: Sector Assistance Program Evaluation.
[2] Partnership Framework among the Government of Bangladesh and Development Partners ADB, Danish International Development Assistance (DANIDA), Government of Japan (GOJ), Government of Korea and the World Bank)
[3] DANIDA provided financial support for SDP preparation. Other Development Partners and the NGOs provided technical assistance.

[4] Financial Year is through July to June

administrative setup, provisions for local government are made at the district, upazila and union levels, but presently elected local governments exist in only the upazilas and the unions (details in Chapter 5). In the urban areas, there are two types of local governments: city corporations for metropolitan cities, and paurashavas (municipalities) for the large-to-medium size towns. There are seven city corporations and 308 paurashavas. The country is governed by a parliamentary democracy and it has a unitary national parliament. There are 35 ministries and seven divisions.[5]

Bangladesh's sustained economic growth has allowed the country to make substantial progress in poverty reduction despite a series of external setbacks. Gross Domestic Product (GDP) grew at an average of 5.8 percent over the past decade, with the GDP per capita reaching US$ 621 in 2009. Ready-made garments and remittances have emerged as the twin drivers of the economy. Even more impressive than the economic growth has been the progress in improving the social and human dimensions. Bangladesh's faster gains in human development result from the public policies that have complemented the remarkable energy at the grassroots level. The population growth rate has declined from 2.9 percent per annum in 1974 to 1.2 percent in 2009. The incidence of poverty has been declining. The national head count index of poverty declined from 57 percent in the beginning of the 1990s to 49 percent in 2000 and then to 40 in 2005.[6] In 2009, the poverty level was estimated to be between 31.1 percent and 32.5 percent. The under-five mortality rate in Bangladesh declined from 151 deaths/1,000 live births in 1991 to 65 deaths/1,000 live births in 2007. During the same period, infant mortality rate reduced from 94 deaths per 1,000 live births to 52.[7]

Despite rises in household income, gaps in poverty across different occupational groups, gender and regions continue to persist. The bottom 40 percent, which coincides with the proportion of the poor in the total population, received only 14.4 percent of the total income whereas the top five percent received nearly 27 percent of the total income in 2005. Studies indicate that the "hardcore" poor are mostly women as they are less involved in income-generating activities. There also remains regional disparity in poverty. Poverty is higher in the western region of the country than in the eastern region. The poverty incidences in the three western divisions, namely Khulna, Barisal and Rajshahi, were 45.7 percent, 52.0 percent and 51.2 percent respectively, in 2005, while the incidences of poverty in the south eastern divisions, namely Dhaka, Chittagong and Sylhet, were 32.0 percent, 34.0 percent and 33.8 percent respectively.[8]

1.2.2 National Planning and Development Framework

For each financial year (FY) from July to June, a national budget is prepared. The national budget has two parts: i) development budget, as reflected in the Annual Development Program (ADP); and ii) revenue budget for administrative and recurring expenses. The GoB traditionally prepares Five-Year national development plans. After a pause of a few years, the government is currently preparing the Sixth Five-Year Plan (FY 2011-15).

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5 Some Ministries are divided into two or more divisions, each headed by a secretary.

[6] Bangladesh Bureau of Statistics (BBS), Household Income and Expenditure Survey (HIES), 2005: No national level HIES was carried out after 2005.

[7] Directorate General of Health Services (DGHS), Health Bulletin, 2009: Management Information System (MIS).

[8] The General Economic Division of the Planning Commission, March 2008: A Strategy for Poverty Reduction in Lagging Regions of Bangladesh.

To improve the efficiency and effectiveness of public expenditure, the government has introduced a Medium Term Budget Framework (MTBF) since FY 2005-06. In the MTBF process, a distinct linkage is established between the policies and priorities of the ministries to resources and, then again, resources to performances of the departments and agencies. MTBF is prepared every year and provides a three-year budget envelope. It is expected to be extended to five years to make it consistent with the Five-Year Plan. Presently, 33 ministries and divisions including the LGD prepare their ADPs under MTBF.[9]

In order to put emphasis on poverty reduction, the first Poverty Reduction Strategy Paper (PRSP-I) entitled *Unlocking the Potentials*: *National Strategy for Accelerated Poverty Reduction (NSAPR I)* was prepared for FY 2005-08. The PRSP-II or NSAPR-II, entitled *Steps Towards Change*, was prepared for FY 2009-11.

The government has adopted a long-term vision for the development of the country which will be reflected in the long-term Perspective Plan (2010-21). The Perspective Plan, under preparation, will set the goals for the future and draw the course of action to achieve these goals by 2021, which will coincide with the Golden Jubilee of the Independence of Bangladesh. Two consecutive Five-Year Plans, the sixth and the seventh, will contribute to the long-term vision.

In the light of the long-term vision, the government has identified five priority areas: (i) maintenance of macroeconomic stability and control over commodity prices in the face of the global economic crisis; (ii) effective action against corruption; (iii) power and energy; (iv) elimination of poverty and inequity; and (v) establishment of good governance.

In order to contribute to the long-term vision, 12 sets of targets for different sectors have been fixed. One of such targets is **"***Ensure living accommodation for the entire population by 2015, supply pure drinking water for the entire population by 2011 and bring each house under hygienic sanitation by 2013.***"** This target indeed reflects the high priority that the government attaches to the WSS sector in its development agenda. The five priority areas and the 12 sets of targets are reflected in the NSAPR-II and the upcoming Sixth Five-Year Plan.

The national planning documents also consider international commitments and goals such as the Millennium Development Goals (MGDs) which aims to halve the proportion of people without sustainable access to safe drinking water and sanitation (MDG 7, Target 10).

1.3 Water Supply and Sanitation Sector

1.3.1 Bangladesh's WSS Coverage in the Regional and Global Contexts

The WSS coverage figures of different developing countries were assessed in a report entitled Progress on Sanitation and Drinking Water 2010 Update prepared by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), which uses a common definition of water

[9] The Finance Division, Government of Bangladesh: Medium Term Budget Framework, 2010-11 to 2012-13. Finance Division web site: www.mof.gov.bd

and sanitation coverage. The WSS coverage figures of seven South Asian countries including Bangladesh, South Asia, and the world are given in Figures 1.1a and 1.1b respectively.

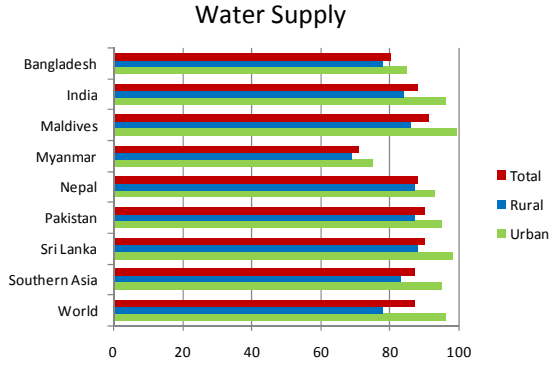


Figure 1.1 (a): Water supply coverage of Bangladesh and regional countries, South Asia and world

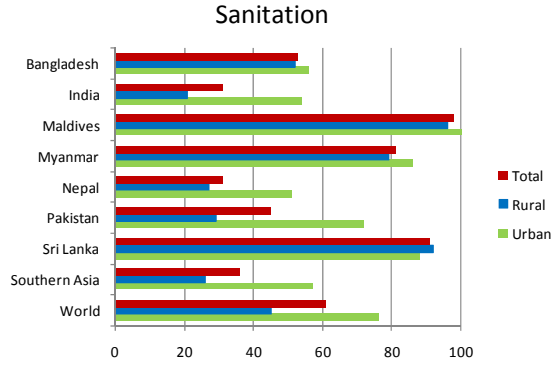


Figure 1.1 (b): Sanitation coverage of Bangladesh and regional countries, South Asia and world

Source: Joint Monitoring Programme (JMP) of WHO and UNICEF, 2008.

The water supply coverage of Bangladesh is 80 percent which is lower than the global and South Asia regional coverage (both 87 percent), Sri Lanka (90 percent), Pakistan (90 percent) and India (88 percent). The Bangladesh sanitation coverage of 53 percent is in between the global (61 percent) and the South Asian (36 percent) coverage. It is, however, lower than that of Sri Lanka (91 percent) but higher than that of Pakistan (45 percent) and India (31 percent). Bangladesh's WSS coverage figures, also according to the Bangladesh standard, are analyzed further in Chapter 2.

1.3.2 Social and Economic Values of Water Supply and Sanitation

Ensuring access to WSS is a moral and ethical imperative deeply rooted in the cultural and religious traditions of communities around the world. While advocating for human values, the World Water Council narrates that dignity, equity, compassion and solidarity are the values shared all over the world and extending WSS services to the poor households would largely contribute to promoting them. The 64th United Nations (UN) General Assembly (July 28, 2010) declared safe and clean drinking WSS as a **human right** that is essential for the full enjoyment of the right to live. The UN also called upon the nations and the international organizations to provide financial resources, build capacity and transfer technology, particularly to developing countries, in scaling up efforts to provide safe, clean, accessible and affordable drinking water and sanitation for all.

The Bangladesh National Policy for Safe Water Supply and Sanitation (NPSWSS) 1998 recognizes water as a social as well as an economic good. The economic benefits from the water and sanitation interventions includes reductions in healthcare and associated health-seeking expenditures and opportunity costs, including time savings. Table 1.1 summarizes the different economic benefits.

Table 1.1: Economic benefits arising from water supply and sanitation interventions

Benefits	Descriptions
Direct economic benefits of avoiding diseases	• Less expenditure on treatment of diseases related to water and sanitation • Less expenditure on transportation in seeking treatment • Less time spent due to treatment seeking
Indirect economic benefits related to health improvements	• Value of avoided days loss at work or at school • Value of avoided time loss of parent or caretakers of sick children • Value of economic contribution of a saved life
Non-health benefits	• Convenience - time saving related to water collection or accessing sanitation facility • Labor saving device in households • Switch away from more expensive water sources • Property value rise • Development of small businesses, improvement in fisheries and other sectors, such as development in tourism

Source: WHO, Human Development Report, 2006: Occasional paper on Economic and Health Effects of Increasing Coverage of Low Cost Water and Sanitation Interventions.

Studies have shown that the economic benefits from safe WSS are substantial. According to WHO (2006), the benefit-cost ratios of Bangladesh and the six regions of the world in terms of their achieving water and sanitation MDGs and universal coverage (100 percent) showed that the returns ranged from about US$5 to US$35 for every US$1 invested (Table 1.2). For Bangladesh, the return on US$1 invested in water and sanitation interventions to achieve the MDGs was estimated to be US$5.4. The return would be US$5.6 for achieving the universal coverage. In other words, the benefits from investments in water and sanitation in Bangladesh would be over five-fold. It is seen in the table that, when comparing the returns on only water supply and only sanitation, the return on sanitation is higher than water supply.

Table 1.2: Benefit-cost ratios of achieving water supply and sanitation coverage

Country/Region	MDG Coverage			Universal Coverage		
	Water	Sanitation	Water and Sanitation	Water	Sanitation	Water and Sanitation
Bangladesh	**3.5**	**6.4**	**5.4**	**3.7**	**6.3**	**5.6**
South Asia	3.5	6.9	6.6	3.9	6.6	6.6
East Asia and Pacific	6.9	12.5	10.1	6.6	13.8	12.2
Sub-Saharan Africa	2.8	6.6	5.7	3.6	6.5	5.7
Arab States	6.1	5.3	5.4	5.9	12.7	11.3
Latin America & Caribbean	8.1	37.8	35.9	17.2	39.2	36.5
Eastern Europe & Commonwealth of Independent States (CIS)	8.3	27.7	18.9	8.9	29.9	27.4
Average of six regions	**4.4**	**9.1**	**8.1**	**5.8**	**11.2**	**10.3**

According to the World Bank Environmental Country Assistance Strategy (2006), the cost of not having clean water and sanitation in Bangladesh, based on DALY (Disability-Adjusted Life-Years) which corresponds to only health benefits (direct and indirect), was estimated to be US$800 million per year. The WHO 2006 Report, which calculated the benefits and costs considering direct, indirect and non-health benefits, found that there was a benefit of US$3,689 million for universal coverage against a cost of US$662 million. The Water and Sanitation Program (WSP) of the World Bank carried out a study (2010) on the economic impacts (considering all aspects of direct, indirect and non-health benefits) of inadequate sanitation and water supply, in a number of countries in the East Asia, the Pacific, and South Asia regions, including Bangladesh.[10] The study concluded that inadequate sanitation has substantial economic impacts in Bangladesh. The annual economic impact of inadequate sanitation is estimated to be BDT 295,500 million, equivalent to US$4,230 million or 6.3 percent of GDP.

1.3.3 Sector Stakeholders

A variety of stakeholders is directly and indirectly involved in the WSS sector. The main groups of stakeholders in the WSS sector are:

- **Government and semi-government organizations:** The government is the main stakeholder and is involved in planning, regulating, implementing and monitoring the development works. The government operates through its various institutional setups at the central level (ministries, divisions, departments and agencies), different tiers of local governments (upazila and union parishads, paurashavas and city corporations), and the semi-government organizations (for example, the Dhaka, Chittagong and Khulna Water Supply and Sewerage Authorities or WASAs). According to the NPSWSS, the Department of Public Health and Engineering (DPHE) is the lead sector agency;
- **Development Partners (DPs):** The DPs make significant contributions to the sector through technical and financial assistance. The scope of their assistance is guided by the policies of their respective governments or organizations, and aligned with national policies and priorities. The DPs channel their assistance mostly through government agencies, while direct support to non-governmental organizations (NGOs) is also common;
- **Non-governmental Organizations (NGOs):** The NGOs work at the grassroots level in different areas, with the participation of the local people, implement as well as support the development projects through motivation and education programs targeting the communities;
- **Community-Based Organizations (CBOs):** The CBOs in the rural areas operate and maintain handpump tubewells or other water points through elected committees and groups. In the urban areas, they are increasingly taking over the responsibility of operating and maintaining water points and community latrines in the urban slums. The facilities that the CBOs manage are provided by either the government or the NGOs;
- **Private sector and individuals:** Many private sector entities, such as private contractors, suppliers, manufacturers and hardware shops are involved directly or indirectly in WSS sector development. Bulk handpump tubewells and latrines in rural and urban areas have been installed by individual households themselves (more in Section 3.9 on PPP). The tube-wells are purchased from hardware shops and are installed by private drilling contractors. The latrine components are purchased from small-scale manufacturers and are installed by individuals themselves or by hiring labor; and

[10] Dr. Abul Barkat, July 2010: Data based on Economic Impacts of Inadequate Sanitation in Bangladesh (draft).

- **Others:** Other organizations and individuals, such as the academic and research institutions, civil society, media, construction and consulting companies, and sector professional, are directly and indirectly involved in the functioning and development of the sector.

1.3.4 Institutional Framework

The institutional framework has taken shape over the past 150 years with the passing of the Bengal Local Self Government Act in 1885, which established union committees responsible for roads, public health and primary education, and which authorized them to raise funds. The municipalities have been rendering public health services since 1863. The DPHE was created in 1935 as a sector agency to promote public health through ensuring the provision of safe drinking water and, since 1954, also sanitation. After the independence of Bangladesh in 1971, the GoB first emphasized rehabilitation of damaged WSS services and subsequently started the installation of new facilities through the DPHE. Since then, the water and sanitation sector has gone through a phase of rapid development with increased participation of the people. A summary of the national WSS institutional framework is presented below (details are given in Chapters 2 and 5).

National WSS Institutional Framework

At the national level, the LGD of the MoLGRD&C is responsible for the overall development of the WSS sector. The DPHE and the WASAs function under the administrative control of the LGD. The DPHE is responsible for implementation of the WSS projects of the public sector in the rural and the urban areas outside the areas covered by the WASAs. In addition to the DPHE, the Local Government Engineering Department (LGED), also under the LGD, implements the water and drainage projects in the urban areas as part of the urban infrastructure development projects. The national-level coordination among the sector stakeholders, such as the government agencies, the NGOs, the DPs and the private sector is done by the National Forum for Water Supply and Sanitation (NFWSS) established within the LGD. The Secretary, the LGD, is the chairperson of the NFWSS.

In the rural areas, the coordination of WSS service provision is the responsibility of the Local Government Institutions (LGIs). The Water Supply and Sanitation (WATSAN) committees of the upazila parishads and the union parishads discharge the responsibility of coordinating the activities of the DPHE, the NGOs and other stakeholders. The district-level LGI, the Zila Parishad, is functionining; however, election is yet to take place.

In the urban areas, the DPHE was originally responsible for the WSS service, but gradually the paurashavas (municipalities) and the city corporations are becoming more involved in planning, implementing and managing the water systems. WASAs were established in 1963 in Dhaka and Chittagong cities, as special purpose institutions, with responsibility for water supply, sewerage and drainage. Since 1990 Dhaka WASA's coverage has extended to Narayanganj Town. In 2008, Khulna WASA was created[11].

The institutional setup of the CHT is different from that in other parts of Bangladesh. The roles of government agencies, including the DPHEs, are provided in Chapter 3.

[11] During the final stages of SDP preparation in 2011 the government established another WASA in Rajshahi city. However, the SDP has shown the related data on water supply and sanitation under its earlier status as a city corporation.

1.4 Sector Development Framework

The development activities of the WSS sector would be planned, coordinated and implemented by the WSS sector institutions under a Sector Development Framework (SDF) based on legal instruments, policies, strategies and plans.[12] A schematic diagram of the Framework comprising the present and intended legal instruments, policies, strategies and plans is shown in Figure 1.2. It is intended that the present documents would be adjusted to align with the new SDP.

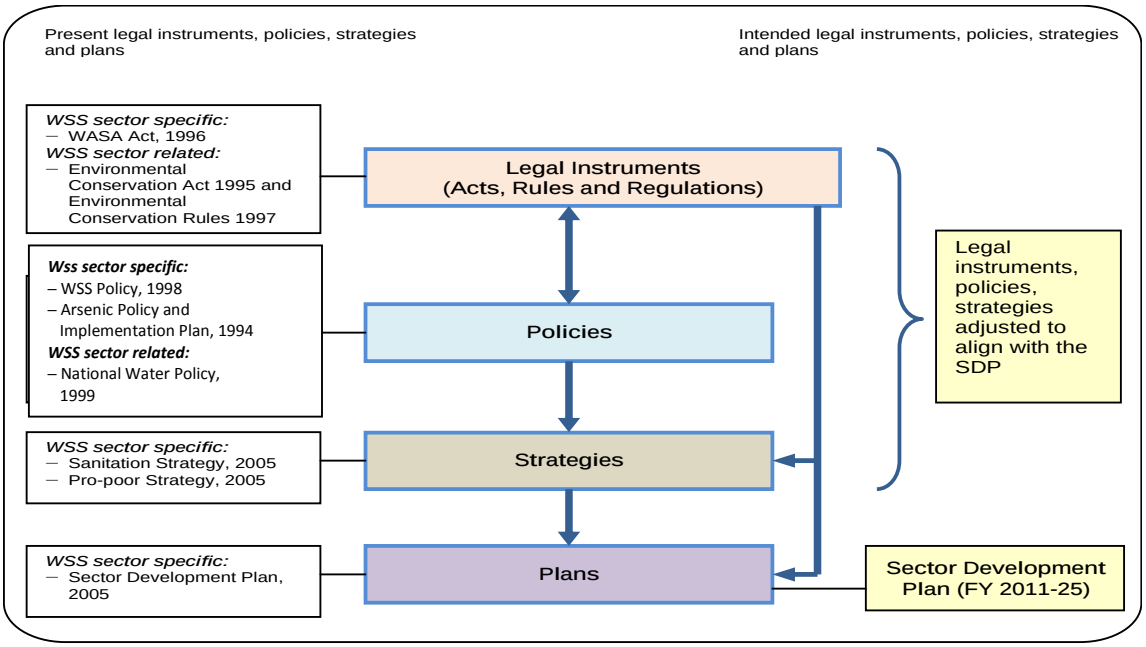


Figure 1.2: Schematic diagram of the Sector Development Framework under which the Sector Development Plan would be implemented.

1.4.1 Legal Instruments

The legal instruments for the WSS sector consist of acts and ordinances specifying the roles and responsibilities of various sector institutions. Some important ones are briefly discussed below:

- the Environmental Conservation Act 1995 and the Environmental Conservation Rules 1997 set the quality of water to be supplied and requirements for disposal of effluents into water bodies;
- WASA Act 1996 describes the roles and the responsibilities of WASAs, including the functions of the Board and Managing Director; and
- the different Local Governments Acts of 2009 for the city corporations, the paurashavas, the upazila parishads, and the union parishads describe the functions and the responsibilities of the LGIs, including matters related to the WSS.

[12] A Sector Development Framework was prepared in 2004 (SDF 2004) which analyzed only the National Policy (NPSWSS of 1998) and suggested a framework to formulate development projects. The above outline of the Sector Development Framework considers the entire sector, including the recommendations of the SDF 2004 and also the legal instruments, other policies and strategies that are both specific and related to the WSS sector.

A detailed analysis of the legal instruments including the streamlining of the existing acts and suggestions for the new acts, rules and regulations is given in Chapter 4.

1.4.2 Policies and Strategies

The following policies, strategies and other documents govern the functioning of the WSS sector in Bangladesh.

- **Specific to Water Supply and Sanitation Sector**
  - National Policy for Safe Water Supply and Sanitation (NPSWSS), 1998;
  - National Policy for Arsenic Mitigation and Implementation Plan (NAMIP), 2004;
  - National Sanitation Strategy (NSS), 2005;
  - Pro-Poor Strategy for Water and Sanitation Sector (PPSWSS), 2005; and
  - National Sector Development Plan for Water Supply and Sanitation, (SDP, 2005)

- **Water Resources Management Sector specific but related to Water Supply and Sanitation Sector**
  - National Water Policy (NWP), 1999; and
  - National Water Management Plan (NWMP), 2004.

- **Cross sector related to Water Supply and Sanitation Sector:**
  - National Strategy for Accelerated Poverty Reduction II (Revised) for FY 2009-11 (NSAPR-II or PRSP-II), 2009; [13]
  - Sixth Five-Year Plan (FY 2011-15);
  - Perspective Plan (2010-21);
  - Bangladesh Climate Change Strategy and Action Plan, 2009; and
  - Invigorating Investment Initiative through Public Private Partnership (PPP), June 2009 (Position Paper of Ministry of Finance).

Bangladesh is also committed to fulfilling international commitments, such as achieving the targets of the MDGs. MDG Goal 7, Target 10, is specifically related to the WSS sector (Section 1.2.2).

The NWP 1999 and the NWMP 2004 provide broad directions for water resources management involving seven sectors, including the WSS sector. A draft Bangladesh Water Act for giving effect to the NWP 1999 is presently under consideration of the government.

The NPSWSS 1998 is the most significant policy for the WSS sector. The Policy aims to bring about changes in the traditional service delivery arrangement and to increase the capacity of the sector. It calls for decentralization of services and emphasizes the participation of the users in planning, development, and operation and maintenance (O&M) of the WSS facilities through local government and the CBOs. The Policy also recognizes the important roles of the NGOs and the private sector in service development and delivery; however, it does not ensure their compliance with the standards.

[13] Government of the People's Republic of Bangladesh, December 2009: Steps Towards Change: National Strategy for Accelerated Poverty Reduction II (Revised): FY 2009-11.

The NSS 2005 was prepared to guide and coordinate the National Sanitation Campaign promoted by the government and other stakeholders. The PPSWSS 2005 was formulated to provide a safety net for the poor.

Over time, with the emergence of new WSS sector-related issues, there has been a need for specific detailed policies, strategies and plans. For example, the NAMIP 2004 was formulated specifically to address the widespread groundwater contamination problem due to arsenic. It comprises measures to mitigate arsenic issues in the WSS, agriculture and health sectors. Presently, the NAMIP 2004 is being reviewed to incorporate new knowledge in arsenic issues and mitigation, which will be shortly reflected in the updated implementation plan. Other cases of addressing the emerging needs are the development of a Cost Sharing Strategy, and a Hygiene Promotion Strategy, both of which are presently under preparation by the LGD.

The WSS sector is also highlighted in some recent national planning documents that direct the country's development path, specifically the high priority given by the government to the WSS sector in the NSAPR-II, Sixth Five-Year Plan, and the Perspective Plan. The Climate Change Strategy and Action Plan, 2009, has also identified the WSS sector as a critical area. The Position Paper of the Ministry of Finance on the PPP, 2009, has considered the WSS sector one of the priority sectors eligible for government's support toward the PPP.

Further review and analysis of the policies, strategies and plans, and streamlining them in accordance with the SDP are given in Chapter 4.

1.5 Objective of the SDP

The objective of the SDP is to provide a framework for planning, implementing, coordinating and monitoring all activities in the WSS sector. It is envisaged that all WSS-related national and sectoral policies and strategies, and international commitments will be aligned with the SDP.

As a strategic planning document, the SDP is expected to address the emerging and the future challenges of the WSS sector. The Plan also provides a road map for the development of the sector and a corresponding sector investment plan. It will be implemented under an SDF, a schematic diagram of which is shown in Figure 1.2. The SDP has assessed the existing legal instruments, policies and strategies, and recommended specific measures to streamline and address the gaps.

1.6 Scope of the SDP

The "development sectors" in Bangladesh are defined in a variety of ways by different agencies, professionals and academics. For example, water supply is often considered a subsector of the water resources sector, sanitation a subsector of the environment sector, and hygiene promotion a subsector or component of the health sector. However, according to the NPSWWS 1998, the WSS sector is considered a separate sector. The SDP analyzes the WSS components covering the urban and the rural areas of Bangladesh.

The scope of sanitation includes a wide range of activities commonly known as environmental sanitation (Box 1.1). Hygiene promotion is one of the fundamentals of ensuring effectiveness and

sustainability of all water and sanitation interventions. Although hygiene promotion cross-cuts both water and sanitation, it has been included under sanitation in the SDP. Some definitions used in the SDP, which are mainly based on the NPSWSS 1998 unless otherwise mentioned, are shown in Box 1.1.

Box 1.1: Definitions of key components and sector

Safe water supply means withdrawal or abstraction of either ground or surface water as well as harvesting of rainwater, its subsequent treatment, storage, transmission and distribution for domestic use.

Sanitation means human excreta disposal, drainage and solid waste management (which are commonly known as **Environmental Sanitation**). **Hygiene promotion**, although not explicitly mentioned in the NPSWSS 1998, is included in sanitation.

Hygiene means keeping oneself and one's surrounding clean to prevent illness or the spread of diseases. **Hygiene promotion** means the process to positively change or develop the behavior related to hygiene practices. (Not defined in NPSWSS 1998 but applied in the SDP).

Sector means the drinking water supply and sanitation sector.

The only departure from the definitions used in the NPSWSS 1998 is the exclusion of solid waste management as a separate sector plan for solid waste management in urban areas is being prepared by the Ministry of Environment and Forest (MoEF).[14] Once this sector plan for solid waste management is prepared, the LGD would synchronize the SDP implementation with it.

1.7 Planning Periods of the SDP

The Three-step Planning Approach

The SDP will be applicable for a period of 15 years, starting in FY 2010-11. The period is divided into long-term planning, medium-term planning, and short-term planning, each of five years' duration, and will coincide with the Five-Year Plan cycles of the government's development planning. The SDP will be a rolling plan, which will be updated every five years.

The short-term planning period would comprise priority programs and projects, which are ongoing, approved and in the pipeline. The programs and projects would have either approved financing or have a good chance of securing financing during the short-term period.

The medium-term planning period should include the next round of priority programs and projects with corresponding estimated financing. Before the end of the first five-year period, the medium-term will be considered the new short-term period with detailed program and project planning, and identification of financing.

[14] MoEF is presently preparing a draft Act and Strategy for Solid Waste Management.

Long-term planning would project the vision of the government on how the sector would develop at the end of the long-term planning period based on possible sector financing, and expected capacity for planning, implementation and the O&M.

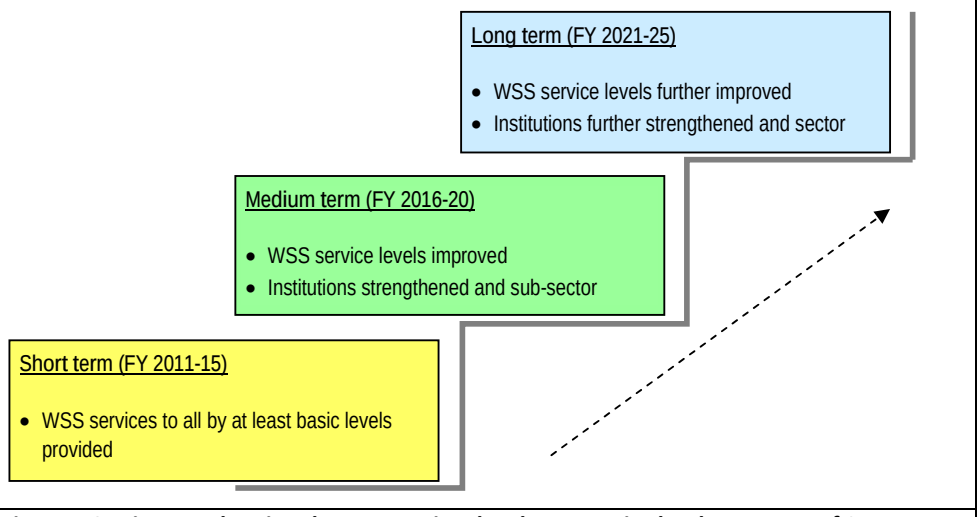


Figure 1.3: Diagram showing the progressive developments in the three terms of SDP implementation

The progressive development of the sector in these three planning terms is illustrated in Figure 1.3. During the short-term period, the aim is to provide at least basic water and sanitation services for all, particularly the poor and vulnerable groups.[15] According to the NSAPR II, safe water supply will be provided for all by 2011 and sanitation for all by 2013. Basic service levels would be ensured at first and then progressively improved. In parallel, institutional strengthening will be initiated. Further, during the short-term, sector governance instruments, such as establishing a legal and regulatory framework, and preparing new policies and strategies or revising the existing policies and strategies, will be completed. Platforms for cooperation and coordination among the sector stakeholders would be established and a step-by-step approach towards SWAp will be initiated. In summary, in addition to providing basic services for all people, the activities in the short-term period will set the ground for progressive and sustainable development in the subsequent terms.

The activities during the medium-term will be built on the firm foundation prepared in the first phase. The service levels would be improved to contribute to the better quality of life. Institutional development would continue and SWAp at the subsector levels (for example, urban and rural) would be established.

During the long–term period, the service levels would be further improved. By then, the sector is expected to have established sound capacity for sustained development. A well coordinated approach would be followed by all stakeholders and a full SWAp established. A detailed road map for the three planning periods is given in Chapter 7.

[15] Basic level and improved services are explained in Chapter 2.

1.8 Approach and Methodology

The SDP was prepared under the leadership and guidance of the Secretary, the LGD, who periodically reviewed its progress and took a lead role in different policy workshops and meetings with the heads and the senior officials of major WSS sector institutions (LGD, DPHE, WASAs, city corporations and paurashavas). A major output of the workshops was a set of "Agreed Statements" signed by the Secretary and the heads of the respective institutions. The statements recorded the broad principles of engagement in the sector and the specific actions to be taken by the institutions for the development of the sector. These actions have also been reflected in the SDP road map.

The NFWSS, under the chairmanship of the Secretary, the LGD, and with members from the government, the donors, the NGOs and the private sector, coordinates and supports the sector activities. Under the Forum, a subcommittee was established to guide and supervise the SDP preparation process. The process of preparing the SDP, including the establishment of different committees, working groups and thematic groups, is explained in the section below.

Working Documents

To support the preparation of the SDP, several working documents were prepared, relevant portions of which are incorporated in this report. These documents are based on: i) the thematic reports prepared by the thematic groups; ii) some specific studies related to the SDP conducted by international experts in cooperation with the SDP consultant team, and for which technical assistance was provided by the DPs (Asian Development Bank (ADB), the Department for International Development (DFID), WSP and UNICEF); and iii) some issue-specific studies carried out by the SDP consultants. In total, 20 working documents were prepared, a list of which is given in Annex 1.

Participation and Consultation

The success of development largely lies in adopting an integrated or holistic approach that takes into account the considerations of the stakeholders, especially the people for whom it is primarily intended. Accordingly, an extensive participatory approach was used during the preparation of the SDP at both the local and central levels. Specific attention was given to the poor and the people living in hard-to-reach areas to ensure that their needs and voices are incorporated in the SDP.

A wide-range of consultations was carried out. Special attention was given to the critical regions of the country – the CHT, char areas (river islands), *haors* (depressed water areas) and flood plains, the coastal belt and drought-prone, low water table areas. Field visits were made and group discussions were held with the rural and urban communities, especially with the poor living in the urban slums and fringes. Several Focused Group Discussions (FGDs) and Key Informant Interviews (KIIs) were organized with the members of local bodies and offices, such as the chairpersons and the members of union parishads and upazila parishads, upazila nirbahi officers, and the DPHE engineers at the upazila and district levels. Separate consultation meetings were held with mayors, waterworks superintendents and other officials of paurashavas. The officials of the city corporations and the WASAs were also consulted. In addition, a broad range of WSS issues was discussed with the NGOs, other civil society members and academia.

Two regional workshops were held in two critical areas of the country: i) in Rangamati town in CHT representing its unique geography, socio-economy and its problems; and ii) in Mohonganj Upazila in Netrokona District representing the *haor* and flood-prone areas.

Dhaka-based stakeholders, such as government ministries and departments (i.e., DPHE and LGED), different project offices and all major bilateral and multilateral donors (ADB, Australian Agency for International Development (AusAid), DFID, Danish International Development Assistance (DANIDA), Japan International Cooperation Agency (JICA), The World Bank, World Health Organization (WHO), UNICEF and the United Nations Development Programme (UNDP)) engaged in the development of the sector were consulted to ascertain their views and obtain feedback on the key issues of the SDP. Specific consultations were held with the Ministry of Primary and Mass Education (MoPME) and the Ministry of Health and Family Welfare (MoHFW) to draw lessons from their experience in the implementation of SWAp in their programs, and to accordingly incorporate those in the design of SWAp in the WSS sector. Finally, three national workshops on the SDP were organized with relevant stakeholders to exchange views and obtain feedback on the key issues of the SDP.

Thematic Groups

The subcommittee of the NFWSS established 12 thematic groups, each given the task to address a specific theme identified as crucial for the SDP. Each group was composed of members from a number of agencies, including representatives of the academia, government agencies, the DPs, the NGOs, the private sector and the SDP consultants, with expertise in the particular theme, and had a focal agency to coordinate the group's activities (see Annex 2 for the list of thematic groups and their members).

The objectives of the thematic groups were:

- To provide technical support related to the themes during the SDP preparation phase; and
- To oversee the implementation of the thematic recommendations and to provide technical guidance during the three SDP planning and implementation periods.

The thematic groups produced reports on the themes, shared new ideas, and reviewed the relevant parts of the SDP.

Peer Review

A peer review of the draft SDP was done by leading sector specialists from the academia, government, the NGOs and the DPs to ensure the high quality of Plan. The names of the peer reviewers are given in Annex 3.

1.9 Organization of the Report

The first chapter provides an introduction to the SDP. The status of the WSS is covered in detail in Chapter 2. An elaborate analysis of the different themes of the sector is given in Chapter 3. Chapter 4 presents the sector-related legislation, policies and strategies while Chapter 5 describes the

institutional strengthening program. The sector investment cost is presented in Chapter 6. Finally, the road map for SDP implementation is given in Chapter 7. At the end of each chapter the actions needed to be taken are recommended. These action points largely constitute the basis for the development of the road map.

The report contains several annexes. Different working papers (list in Annex 1) prepared as background material for the SDP will be available on the PSU's website (www.psu-wss.org).

A summary version as well as the main report of the SDP is also available in both English and *Bangla* (Bengali). The summary version focuses on sector challenges, opportunities, investment requirements and the road map for SDP implementation.

Chapter 2

Status of Water Supply and Sanitation

This chapter begins with a historical background of the WSS in Bangladesh and then presents the challenges of defining and assessing the coverage of the sector. It is followed by an assessment of the national coverage of the WSS. Further, the technical aspects, service levels and coverage figures of the urban and rural subsectors are elaborated, the related issues identified, and action points presented. The other aspects of the WSS, such as water resources management, water quality management, hygiene promotion, and social, institutional and financial matters are discussed in the subsequent chapters.

2.1 Water Supply: Background, Definitions and Coverage

2.1.1 Background

Traditional drinking water sources were mainly ponds, dug wells and canals before the independence of Bangladesh in 1971. Then only a handful of towns had piped water supply. The introduction of piped water supply to many district towns stared in the 1980s, mainly through the DPHE. Gradually, the paurashavas are becoming involved in water supply service delivery. In order to address the WSS needs of the growing large cities, WASAs were established in Dhaka and Chittagong in 1963 and in Khulna in 2008. Recently, WASA has also been established in Rajshahi. Piped water supply is gradually being introduced to the small towns at the upazila level.

During the early 1970s, handpump tubewells in rural areas were first introduced on a large scale by the government, through the DPHE, free of cost. Tubewell materials like pipes and well screens were imported and the DPHE was responsible for tubewell installation, and the O&M. The government-led tubewell projects had a positive demonstration impact on the users and the private sector. Over time, the capacities of the communities and the local market developed immensely. In the 1980s, the O&M of the tubewells was fully transferred to the user communities. The manufacturing and installation capacity of the private sector increased substantially. Individuals installed only a nominal number of private tubewells procured from the market during the 1970s, but by now private individuals have installed about 80 percent of the total tubewells in the country, the majority of which are shallow handpump tubewells for individual households. The NGOs are also providing some tubewells mainly for the poor communities. Till now rural water supply is predominantly handpump tubewell based and, in a minority of cases, some other water points like pond sand filters (PSFs), ring wells and rainwater harvesting units are used.

2.1.2 Definitions and Coverage

Challenges for Water Supply Coverage

Broadly, there are two challenges that the sector faces with regard to defining and assessing water supply coverage as follows:

- definition of coverage based on a uniform standard; and
- absence of reliable data to assess coverage.

Definition of Coverage: Historically, the standard applied for assessing water supply coverage by the sector agencies, for example the DPHE, has varied over time depending on the development context, ranging from one water point for 150 people to 50 people. According to the NPSWSS 1998, the standard to be applied for assessing water supply coverage is based on one water point for 50 people but without specification of a timeframe for compliance. Further, this standard is applicable for rural areas but is not suitable for urban areas with piped water supply. Furthermore, the government has set a target to provide water supply for all by 2011 which, for practical reasons, implies having an acceptable standard to meet the immediate target. Again, many sector professionals and agencies often use the definition of the Joint Monitoring Program (JMP) to assess the coverage of the WSS. The JMP definition is generally used as a common standard for the developing countries to assess the progress towards achieving the MDG goals with regard to the WSS. UNICEF publishes the JMP survey data on the WSS, along with some other data, and it contributes to reports on Multiple Indicator Cluster Survey (MICS). Different countries, however, may have different standards to suit their specific national needs.

Absence of Reliable Data: The absence of reliable data in both urban and rural areas is another challenge to assessing the coverage. In case of urban areas, either the production wells do not have water meters or the meters are not calibrated to provide reliable figures. Again, there are no household water meters in a majority of the urban areas and there is no proper record of the number of connections (both legal and illegal). As service connections serve different types of houses, including multistoried buildings, the number of people connected to each service connection cannot be properly determined. As a result, the reliable values of the water produced and the water used cannot be determined. Besides, there is a large number of public and private handpump tubewells in the urban areas. Many people with house connections also have handpump tubewells. As the exact numbers of the handpumps and the people using them are unknown, the coverage by handpump tubewells in urban areas is difficult to determine.

Similar problems exist in the rural areas. There has been no national baseline survey for water supply, as in the case of the sanitation baseline survey of 2003, by which the total number of tubewells or other types of water points could be determined. There are records of public handpump tubewells and other water points, but there is no record of those installed by the private individuals. The records of water points installed by the NGOs are also difficult to obtain.

Hence, in the absence of a clear definition of standards for coverage of water supply, the SDP has considered two types of Bangladesh standards as given below. In addition, the JMP standards are also considered for comparing progress of Bangladesh with other developing countries.

Bangladesh Basic Standard: The water supply facilities by which, at least, the government's target of water supply for all by 2011 would be achieved;

Bangladesh Improved Standard: The water supply facilities by which, at least, the targets of the NPSWSS 1998 would be achieved; and

JMP Standard: The water supply facilities by which, at least, the targets of the MDGs as defined by JMP would be achieved.

The detailed definitions of the three standards for assessing water supply coverage are given in Table 2.1. The main difference between the two Bangladesh standards and the JMP standard is that the JMP standard considers only the use of "safe water source;" it does not consider service levels like the number of people using a tubewell in rural areas or using a house connection or a community tubewell in the urban areas. Bangladesh basic standard considers one water point for 100 persons while Bangladesh improved standard considers one water point for 50 people.

Table 2.1: Different standards for assessing water supply coverage

Bangladesh Basic Standard	Bangladesh Improved Standard	JMP Standard
The following water supply facilities should be provided to achieve, at least, the government's target of providing water supply to all by 2011	The following water supply facilities should be provided to achieve, at least, the targets set in the NPSWSS 1998	The following water supply facilities should be provided to achieve, at least, the targets of the MDGs
Individual or shared water supply facilities of the following types **Urban and Rural** • Piped water supply to households with multiple taps, yard connections or shared connections • Public standpipe shared by, at most, 100 persons • Safe water points, like handpump tubewells, ring wells, PSFs, protected dug wells, protected springs and rainwater harvesting system; public water points are shared by, at most, 100 persons and private water points by 5 persons	Individual or shared water supply facilities of the following types **Urban** • Piped water supply to households with multiple taps, yard connections or shared connections • Public standpipe shared by, at most, 50 persons **Rural** • Piped water supply to households with multiple taps, yard connections or shared connections • Public standpipe shared by, at most, 50 persons • Safe water points, like handpump tubewells, ring wells, PSFs, protected dug wells, protected springs and rainwater harvesting system; public water points are shared by, at most, 50 persons and private water points by five persons	Individual or shared water supply facilities of the following types **Urban and Rural** • Piped water supply to households with multiple taps, yard connections or shared connections • Public standpipe • Safe water points, like handpump tubewells, ring wells, PSFs, protected dug wells, protected springs and rainwater harvesting system

2.1.3 Summary of Present Water Supply Coverage

In the context of the absence of reliable data in the urban and rural areas, the estimations for water supply coverage have been made in the following manner. The present urban water supply coverage figures were taken as estimated by the respective city corporations, paurashavas and the DPHE. The estimates made by these organizations are based on available local information and consider factors, such as water production, number of house connections, street hydrants and handpump tubewells, and the area covered by piped networks.

According to the sector experts, the estimated number of private shallow handpump tubewells in rural areas is eight times that of the public ones, the number of private deep tubewells and Deep Set Pump (DSP) tubewells is about one-third of the public ones, and the number of other private water points like different alternative technologies (for example, PSF and rainwater harvesting) is one tenth of the public ones. These estimates are considered in determining the total number of different types of water points in the rural areas. It may be noted here that the public and the NGO tubewells or water points provide water to a community consisting of a number of households, whereas the private water points usually serve only one household (average five persons); this aspect has also been considered while determining coverage figures in the rural areas.

A summary of water supply coverage based on the Bangladesh basic standard, Bangladesh improved standard, and the JMP standard are given in Table 2.2. The JMP figures are based on sample household surveys jointly carried out by the Bangladesh Bureau of Statistics (BBS), WHO and UNICEF (also referred to as the MICS report of 2009). The present country water supply coverage is 74 percent according to the Bangladesh basic standard, 50 percent according to Bangladesh improved standard, and 85.5 percent according to the JMP standard. A detailed breakdown of the coverage in the different categories of urban and rural areas and further elaboration on the assessment procedures are given in the sections that follow.

Table 2.2: Summary water supply coverage according to different standards

Areas	**Percentage of Water Supply Coverage**		
	Bangladesh Basic Standard	**Bangladesh Improved Standard**	**JMP Standard**
Urban	82	34	93.3
WASAs	84	72	-
City Corporations	76	61	-
Paurashavas and growth centers	85	12	-
Rural	71	51	83.8
Country	**74**	**50**	**85.5**

2.2 Sanitation: Background, Definitions and Coverage

2.2.1 Background

The progress in sanitation, particularly in the rural areas, was rather slow during the 1980s and the 1990s; the sanitation coverage growth rate was merely one percent per annum. A national baseline survey conducted by the government in October 2003 to assess the extent of sanitation coverage revealed that, of a total number of over 21 million households in the country, only 33 percent were using hygienic latrines, 25 percent unhygienic latrines, and 42 percent having no latrine were resorting to open defecation. This poor coverage led the government to launch the National Sanitation Campaign to achieve rapid progress in sanitation in the country. A national sanitation goal of "100 percent Sanitation by 2010" was initially set. However, realizing the practical situation, in 2009, the goal was subsequently revised to achieving"100 percent sanitation by 2013."

Since the launch of the National Sanitation Campaign in 2003, the government has made several policy and operational decisions to promote sanitation. The National Sanitation Secretariat was formed and taskforces were established from the national to grassroots levels to support and institutionalize the interventions. The month of October is observed as "Sanitation Month" each year since 2003. A mass-media campaign is organized to create greater awareness among the people about the necessity of sanitation and hygiene practice. The government earmarked 20 percent of the ADP grant to the upazilas specifically for sanitation, for the exclusive use by the upazilas, paurashavas, city corporations and the union Parishads. Importantly, the government encouraged a partnership approach with the LGIs, the NGOs, the DPs and the civil society, which has provided a wide platform for multiple stakeholder partnerships and created a synergistic effect in increasing the sanitation coverage.

2.2.2 Definitions and Coverage

Challenges for Sanitation Coverage

As in the case of water supply, there are two types of challenges for sanitation coverage as follows:

- definition of coverage based on a uniform standard; and
- absence of reliable data to assess coverage.

Definition of Coverage: Different definitions of latrines are used in the country (Box 2.1) and consequently there exist different coverage definitions and figures on sanitation coverage.

Box 2.1: Commonly used definitions of latrine types

Hygienic Latrines: These latrines effectively control the fecal-oral route of disease transmission. The National Sanitation Strategy 2005 recommends the use of hygienic latrines and the minimum standard of this latrine type is a pit-latrine with a water seal, lid or flap.

Improved Latrines: According to WHO-UNICEF's JMP, these latrines "ensure hygienic separation of human excreta from human contact." The minimum standard of this type of latrine is a pit-latrine with slabs.

Unhygienic latrines: These latrines allow fixed point defecation but humans may come into direct or indirect contact with human excreta through various routes. This type of latrine includes pit-latrines without slab and bucket latrines.

Absence of Reliable Data: The National Sanitation Secretariat housed at the DPHE publishes reports on sanitation coverage based on data collected from the union parishads, paurashavas and the city corporations. The reports basically update data collected during the National Sanitation Survey in 2003. However, there are limitations on using these reports mainly because the coverage figures do not consider the population increase since 2003 and the reporting system does not always have means of verifying or cross-checking the data. The MICS 2009 provides more realistic and detailed figures, including the usage pattern of different types of people. Thus the data provided by the MICS report are taken as the basis for estimating sanitation coverage. However, in the absence of breakdown of the data in the MICS report, the data from the National Sanitation Secretariat are sometimes used as reference.

Due to reasons similar to those for water supply, three types of sanitation standards are used to assess the sanitation coverage: i) Bangladesh basic standard; ii) Bangladesh improved standard; and iii) JMP standard. The details are given in Table 2.3. The basic standard of sanitation coverage is considered for achieving the government's target of sanitation for all by 2013 while the Bangladesh improved standard is in accordance with the standard set in the National Sanitation Strategy 2005. The JMP standard is according to the JMP definitions. The main differences amongst them are that the basic standard considers the use of improved latrines but one latrine could be shared by more than one household; the JMP standard is the same as Bangladesh basic sanitation standard except that the latrine is not shared by more than one household whereas the Bangladesh improved standard considers using hygienic latrines which could be shared by a maximum of two households.

Table 2.3: Definitions of different types of standards to assess sanitation coverage

Bangladesh Basic Standard	Bangladesh Improved Standard	JMP Standard
The following sanitation facilities would be provided to achieve, at least, the government's target of sanitation for all by 2013	The following sanitation facilities should be provided e in accordance with the standard set in the National Sanitation Strategy 2005	The following sanitation facilities would be provided to achieve, at least, the targets of the MDG by JMP definitions
Individual or shared latrines of the following types: • Flush and pour-flush toilet/latrines to piped sewer system or septic tank • Ventilated improved pit latrines • Composting latrines • Pit latrines with slab and water seal or lid or flap • Pit latrines with slab but no water seal, lid or flap	Individual or shared hygienic latrines shared by maximum two households of the following types: • Flush and pour-flush toilet/latrines to piped sewer system or septic tank • Pit latrines with slab and water seal or lid or flap • Ventilated Improved pit latrines • Composting latrines	Individual latrines of the following types: • Flush and pour-flush toilet/latrines to piped sewer system or septic tank • Pit latrines with slab and water seal or lid or flap • Pit latrines with slab but no water seal, lid or flap • Ventilated improved pit latrines • Composting latrines

2.2.3 Summary of Sanitation Coverage

Based on the data of the MICS 2009 report, national sanitation coverage, with a breakdown for different areas, according to the three definitions of sanitation coverage in 2009, is shown in Table 2.4. The status in 2003 is also shown in the table.

Table 2.4: Summary of sanitation coverage

Areas	Baseline status in 2003		Percentage of sanitation coverage in 2009		
	Total Number of Households	Percentage of Households using Hygienic Latrines(basic standard)	Bangladesh Basic Standard	Bangladesh Improved Standard	JMP Standard
Urban	3,067,761	60.0	86.4	58.0	53.5
City Corporations	1,216,424	69.9	87.6	60.2	53.3
Municipalities	1,851,337	53.1	85.8	57.5	54.7
Rural	18,326,332	28.8	78.9	49.9	54.3
Country	**21,394,093**	**33.2**	**80.4**	**51.5**	**54.1**

A further detailed breakdown of the coverage figures in different categories of urban and rural areas is provided in the sections below.

The sanitation coverage is high when basic sanitation is considered but it declines when more stringent conditions for improved sanitation or hygienic sanitation are considered. The national sanitation coverage in 2009, according to basic sanitation, is 80.4 percent but is much lower, 52.5 percent and 54.1 percent, according to the Bangladesh improved standard and JMP standard, respectively. Figure 2.1 shows the change of national sanitation coverage from 2003 to 2009 in terms of the basic sanitation standard. There is a sharp increase in basic sanitation coverage, up from 33 percent to 80.4 percent and a drastic reduction in open defecation, down from 42 percent to only 5.7 percent.

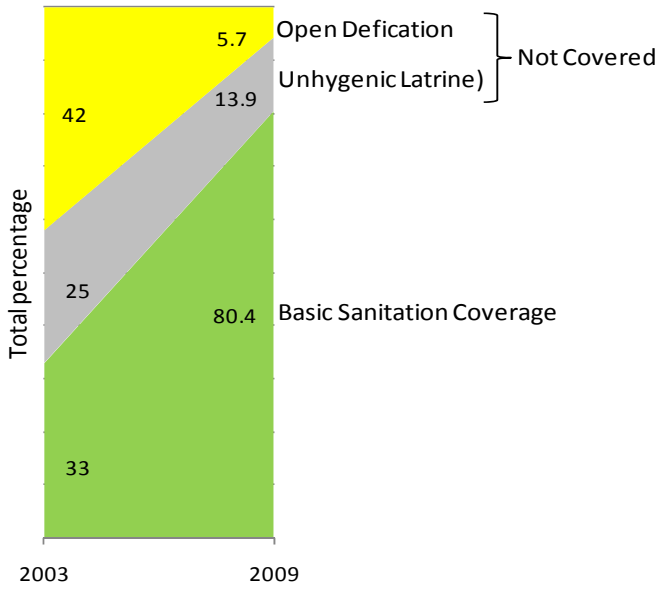


Figure 2.1: Sanitation coverage in 2003 and in 2009

2.3 Water Supply and Sanitation Subsectors

The WSS sector in the SDP is divided into two subsectors because of the distinct characteristics of urban and rural areas:

- Urban Water and Sanitation Subsector; and
- Rural Water and Sanitation Subsector.

These two subsectors are further divided into broad categories as described in the following sections. Special emphasis is given to the CHT in both subsectors due to its unique socio-cultural and administrative context.

2.3.1 Urban and Rural Population Projection

The BBS population projections up to 2025 are shown in Figure 2.2. The disaggregated population projections (that is, urban and rural) by the Planning Commission, the Urban Development Directorate (UDD) and the National Institute of Population Research and Training (NIPORT) were reviewed and, based on that, further projections were made for the urban and rural areas. The projections reveal that the rural population is expected to stabilize after 2015 and its growth rate would decrease after 2025. On the other hand, the urban population is expected to increase sharply, mostly due to high migration from the rural to the urban areas as well as the urbanization of rural areas. The total population of the country in 2015, 2020 and 2025, is projected to be 162 million, 172 million and 183 million, respectively. These projections have been used for the purpose of analyzing the WSS sector development needs in the urban and rural areas. The graph also indicates that by the year 2035, urban and rural population will have the same size of population of about 100 million each.

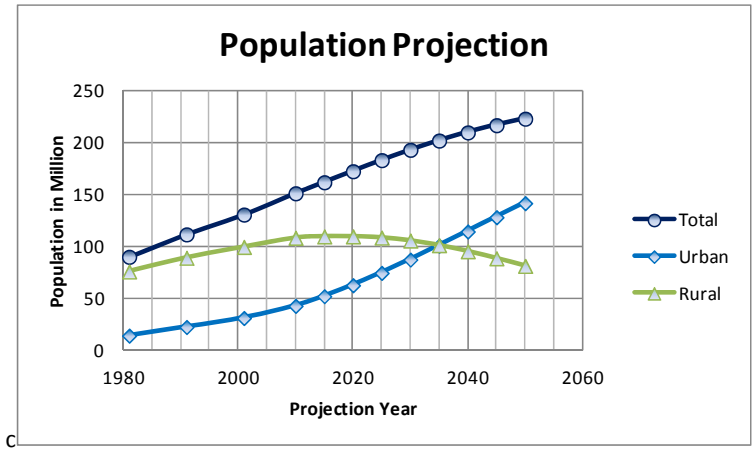


Figure 2.2: Population projection

2.4 Urban Subsector

Bangladesh had six city corporations[16] and 308 paurashavas (municipalities) in 2009. Out of the six city corporations, there are separate WASAs operating in three large cities – Dhaka, Chittagong and Khulna. The other city corporations and the 308 paurashavas themselves manage their water and sanitation services.

[16] During the final stages of SDP preparation the Government declared Rangpur as a new city corporation. However, the SDP has shown the related data on water supply and sanitation under its earlier status as a paurashava

2.4.1 Urban Service Delivery

The major types of service delivery modalities in urban areas are presented below. The institutional arrangements are elaborated in Chapter 5 entitled Sector Capacity Building.

WASAs: WASAs are large WSS utilities which operate the systems, collect fees and implement development projects. Dhaka and Chittagong WASAs were created in 1963. Khulna WASA was created recently, in May 2008. Khulna WASA is still in its early stage of organizational development. The functions and staff of the water and sanitation section within the Khulna City Corporation have recently been transferred to it.

LGIs: The urban LGIs, that is, city corporations and paurashavas, are responsible for the O&M of the water supply systems. The construction of new water supply systems and major rehabilitation programs are primarily carried out through the DPHE. After completion of the works, the DPHE hands over the WSS systems to the city corporations and paurashavas for their O&M. The LGIs usually carry out small extensions of the piped system, and provide tubewells and other water points, and sanitation units, particularly for the low income communities.

Small-scale Service Providers: At present, the small-scale service providers are mostly the NGOs operating water points connected to piped water systems in low income communities. There is no formal private operator managing piped water supply, except for a few service contracts for billing (more in Section 3.9.1 on Private Sector Participation).

Private Individuals: In addition to the public services of piped water supply and sewerage, private individuals (households) install their own tubewells. Sanitation is mostly handled by private individuals.

NGOs: The NGOs provide tubewells, other water points, community latrines and pit latrines for the low income communities.

The urban subsector is divided into two categories on the basis of different institutional arrangements for water and sanitation and the size of the cities:

- cities with WASAs; and
- city corporations and paurashavas.

The status of the two categories is explained below.

2.4.2 Cities with WASAs

Water Supply

Dhaka is the capital of Bangladesh, Chittagong a port city, and Khulna an industrial city. These cities, particularly Dhaka and Chittagong, are characterized by high population density and growing economic activity, leading to heavy pressure on the available space, infrastructure and environment. These cities are rapidly growing vertically, with many high-rise buildings requiring high-capacity connections (delivering high volume of water) to serve large offices. These developments are putting pressure on the already stressed water supply system. Central solutions for sanitation, such as sewerage systems face the challenges of densely populated areas, lack of space and geophysical

inclination (except in Chittagong), and heavy traffic. Moreover, sewerage is expensive in terms of investment and O&M. About 35 percent of the population of the city corporations lives in slums, and does so on only four percent of the land area.[17]

Consequently, all the cities are facing a shortage of water supply sources. Groundwater is the major source of water supply. Aquifer yields to meet the growing demand for water have already become limited. As a result, the new sources would mostly have to be surface water which would, however, require higher investments than groundwater-based systems. During the SDP preparation, an assessment of the potential of groundwater and surface water for the six metropolitan cities was carried out (see Section 3.3).

The status of water supply of the cities with WASAs is given in Table 2.5. Only Dhaka has comparatively high coverage with piped water supply (83 percent) whereas the coverage in Chittagong and Khulna is far lower - at 41 percent and 45 percent, respectively. Except for Khulna, which has about 10,000 handpump tubewells, the number of water points in the other two cities is insignificant. Many people collect contaminated water from rivers and ponds or carry water from distances. The water points like handpump tubewells are not appropriate for large cities (except for Khulna city where deep tubewells are feasible) with high population density because of their low capacity and also because they abstract water from shallow aquifers, which are vulnerable to contamination by the densely spaced septic tanks and latrine pits. Thus the large cities have to rely on piped water systems.

The O&M of the water supply system is inadequate, as reflected in high water losses or what is technically termed as Unaccounted for Water (UfW). The UfW in Dhaka is about 35-40 percent; Chittagong and Khulna are estimated to have similar values. Periodic maintenance of the systems is not done properly resulting in leakages in pipelines and early deterioration of pipes, wells and machinery. Most of the connections in Dhaka and Chittagong have water meters but there are none in Khulna. No WASA has 24/7 water supply. Dhaka supplies water for about 22 hours per day, but there is a serious water crisis during the dry season. The water supply crisis is compounded by frequent power outages. The other two WASAs can only supply water for nearly 12 hours per day and have similar water crises. Dhaka can recover only a small part of the investment cost whereas Chittagong and Khulna can hardly recover the O&M costs.

Table 2.5: Water supply status in cities with WASAs

WASAs	Estimated Population in 2010 (million)	Daily Water Production (m^3)	GW Source (No. of PW)	SW Source (No. of TP)	Pipeline (km)	House Connection (No.)	Supply Hours	Improved Coverage by Piped Water Supply (%)	Basic Coverage by Piped Water Supply and Water Points (%)
Dhaka	10.29	1,920,000	501	4	2,533	266,555	22	83	88
Chittagong	3.31	200,000	73	1	556	46,299	12	41	46
Khulna	1.26	35,000	56	-	227	15,300	12	45	85
Total	**14.86**	**2,155,000**	**630**	**5**	**3,316**	**328,154**	**12-22**	**72**	**80**

GW – groundwater; SW – surface water; PW – production well; TP – treatment plant; m^3 – cubic meter
Source: Water and Sewerage Authority (WASA), June 2009: Status reports.

[17]Centre for Urban Studies (CUS) Bangladesh, NIPORT Bangladesh, 2005: Mapping and Census 2005, Measure Evaluation Slums of Bangladesh, University of North Carolina at Chapel Hill and USAID, May 2006.

Sanitation

Conventional sewer systems are absent in all urban areas except Dhaka. Only 25 percent of the population of Dhaka is served by a sewer network, the rest use onsite options, such as septic tanks, pit latrines, unhygienic latrines or none at all. The amount of waste that is collected in Dhaka sewers is three times higher than the capacity of the only wastewater treatment plant (at Pagla) and therefore the plant is bypassed and most of the wastes are discharged untreatedly, directly into the river. Many buildings in the large cities, including high-rises, are not connected to any kind of sanitation system or their septic tanks often overflow and discharge their effluent in the drains or straight into lakes, canals and rivers, causing serious pollution and health hazards in the densely populated areas. The sanitary conditions of urban slums are deplorable. Only eight to 12 percent of households in slums have hygienic latrines. Most slum dwellers have no other options than to dispose of wastes in drains and open fields, and by road sides or river banks.

In the absence of individual city data of the three cities in the MICS report, only the average figures of the six city corporations are shown in Table 2.6. In the same table, the sanitation status of the three cities as per the National Sanitation Secretariat is also given as reference.

Table 2.6: Sanitation status in cities with WASAs

WASAs	Baseline Status in 2003		Percentage of Sanitation Coverage as per San. Sect. in 2009*	Sanitation Coverage Percentage (calculated from source MICS 2009 data)**		
	Total Number of Households	Percentage of Households using Hygienic Latrines		Basic Standard	Improved Standard	JMP Standard
Dhaka	669,767	81.6	84.6	n.a.	n.a.	n.a.
Chittagong	310,698	51.1	87.4	n.a.	n.a	n.a.
Khulna	92,214	57.8	70.0	n.a.	n.a.	n.a.
Total	**1,072,679**	**71%**	**84.0**	**87.6**	**60.2**	**53.3**

* *National Sanitation Secretariat, DPHE, June 2009: Status Report.*

** *Average of six City Corporations.*

Partnership Framework for WASAs

The government has placed high priority on developing the WASAs as efficient agencies and signed a Partnership Framework Agreement[18] for the three WASAs with DPs. The objective of the Agreement is to address reform issues and to improve and extend water, sanitation, drainage and wastewater services. Under the Framework Agreement, the strategies are: i) governance improvement and

[18] Partnership Framework Agreement was signed between GoB and DPs (ADB, DANIDA, Government of Japan, Government of Korea and the World Bank) in 2007 for Dhaka and Chittagong WASAs and amended in 2009 to include Khulna WASA.

organizational development; ii) financial management improvement; and iii) service delivery improvement and expansion. To support the strategies, a Policy Matrix was prepared to agree on the key activities and reform milestones, milestones to monitor the progress, and the investments to be made by the government and DPs. Many development activities have already started, including feasibility and engineering design, studies for capacity building and financial management, and investments in infrastructure rehabilitation and expansion.

2.4.3 Status of City Corporations and Paurashavas

Water Supply

Of the six city corporations, three cities have WASAs and the other three cities are Rajshahi, Barisal and Sylhet. Similar to the cities with WASAs, groundwater is the major source and the future source would mostly be surface water. The status of these three city corporations is given in Table 2.7. Piped water supply coverage is 73 percent in Rajshahi, but lower in Sylhet and Barisal – 40 percent each. All three cities have water supply for about 12 hours per day. In addition to the piped system, Rajshahi and Barisal have 6,500 and 1,700 handpump tubewells. There is an insignificant number of handpump tubewells in Sylhet due to the absence of a suitable aquifer.

Table 2.7: Water supply status in three City Corporations

City	Estimated Population in 2009 (million)	Daily Water Production (m^3)	GW Source (No. of PW)	SW Source (No. of TP)	Pipeline (km)	House Connection (No.)	Supply Hours	Coverage by Improved standard i.e. by Piped Water Supply (%)	Coverage by Basic Standard i.e. by Piped Water Supply and Water Points (%)
Rajshahi	0.61	75,190	49	1	512	26,000	12	73	84
Sylhet	0.42	16,890	18	1	145	9,892	12	40	69
Barisal	0.30	10,721	18	-	165	9,852	12	40	45
Total	**1.33**	**102,801**	**85**	**2**	**822**	**45,744**	**12**	**61**	**75**

GW – groundwater; SW – surface water; PW – production well; TP – treatment plant
Source: City Corporations, June 2009: Status reports.

Out of the total 308 paurashavas, there are piped water supplies in 102 paurashavas and, in another 58 paurashavas, it is in various stages of implementation. In the non-piped water supply paurashavas, handpump tubewells are used. At present, there are 31 large paurashavas, each with more than one million people on average while the population of medium to small paurashavas ranges from 30,000 . A summary of the key features of the paurashavas having piped water supply is given in Table 2.8.

The piped water supply systems in the paurashavas cover only a limited population (40 percent), mostly located in the center of the town. The coverage, however, varies from paurashava to paurashava ranging from almost nil to about 60 percent. The supply hours vary from two to 12 hours per day and the average water supply is 75 liters per capita per day (lpcd). With an estimated UfW of

about 40 percent, the net amount of water available for consumers connected to the piped systems is only around 45 lpcd. On the other hand, the production capacities of many water supply systems are not fully utilized because of the limited number of connections and distribution lines.

People use handpump tubewells in non-piped areas. As mentioned earlier, even in the houses with piped connections, many have handpump tubewells as they cannot entirely depend on the irregular piped supply. There are 152,007 handpump tubewells in the paurashavas. The combined water supply coverage by piped system and handpump tubewells is estimated to be 85 percent.

Table 2.8: Piped water supply status in Paurashavas

Items	Amounts
Number of paurashavas having piped water supply	102
Total population in the 102 paurashavas in 2009	7.93 million
Total water production	238,542 m^3/day
Total number of handpump tubewells	152,077
Total number of house connections	175,532
Number of street hydrant	3,355
Supply hours	2-12 hours
Population served by piped water supply	40%
Population covered by piped water supply and handpump tubewells	85%

Source: DPHE, June 2009: Status reports.

Water supply development in the city corporations and paurashavas took place on an ad hoc basis – mostly according to finances available in development projects. The DPHE is assisting the city corporations, some large paurashavas and 148 small paurashavas (with no piped water supply systems) in preparing master plans for the WSS. The remaining paurashavas need to create their master plans as well so that development in water and sanitation can be carried out in a systematic way.

In the city corporations and the paurashavas, periodic maintenance of the water supply system is not done properly. Periodic maintenance requires regular inspection of the system, leak detection and quick repair, maintenance and replacement of pipeline fittings and other machines, regular flushing of pipelines (more where there is iron and salinity in the supply water) and regeneration of production wells. Due to the lack of proper maintenance, the systems deteriorate quickly and experience shows that, within three to four years after completion of development works, many systems collapse. Many of the production wells remain nonfunctioning and pipelines continue leaking. Usually, the city corporations and the paurashavas do not disinfect supply water (from groundwater) with bleaching powder or chlorine.

Water is supplied only during a few hours of the day, meaning that there is no pressure in the pipeline during non-supply hours and this allows the contaminants to seep into the pipes through leakages from the surface, or even from drains and sewage from pit latrines and septic tanks. Therefore, the water quality is at high risk. Customer care service is not common; however, some projects have trained the paurashava staff and developed systems to record and respond to customer complains.

The absence of demand management is the main drawback of the operations of the present systems. The city Corporations and paurashavas do not have water meters (with the exception of few paurashavas). As a consequence, the level of consumption is not a function of the price but of availability of supply. A huge amount of water is wasted at the user level due to the absence or not closing of taps in many houses, allowing water to flow freely during the supply hours. With an increase in supply hours and pressure, the wastage at the users' level and leakage through pipelines will increase. There are no provisions for incentives to conserve water and penalties for overuse or misuse. Similarly, there are no incentives or penalties for hygienic sanitation.

Sanitation

As none of the cities and paurashavas has any sewage line, they use onsite sanitation options. The sanitation coverage is given in Table 2.9.

Table 2.9: Sanitation status in City Corporation and Paurashavas

Areas	Baseline Status in 2003		Percentage of Sanitation Coverage as per San. Sect. in 2009*	Sanitation Coverage Percentage (calculated from MICS 2009)**		
	Total Number of Households	Percentage of Households using Hygienic Latrines		Basic Standard	Improved Standard	JMP Standard
Rajshahi	63,909	77.7	97.5	n.a.	n.a.	n.a.
Barisal	36,763	61.1	84.6	n.a.	n.a	n.a.
Sylhet	43,073	47.1	89.8	n.a.	n.a.	n.a.
Total 3 City Corporations	**143,745**	**64.5**	**91.9**	**87.6**	**60.2**	**53.5**
Total all Paurashavas	**1,851,337**	**53.1**	**91.2**	**85.8**	**57.5**	**54.7**

* *National Sanitation Secretariat, DPHE, June 2009: Status Report.*

** *Average of six City Corporations.*

The paurashavas and the national development projects provide some water-sealed pit latrines for the low-income communities.

The desludging of the pit latrines and septic tanks and safe disposal of waste are the worrying environmental problems. Although the sanitation coverage in the urban areas is comparable to the

rural ones, the negative impact is worse because of the high population density. With more people living in urban areas in the future and with increasing population density, the environmental situation will further deteriorate, especially in the urban slums.

2.4.4 Urban Drainage

Bangladesh being mostly a flat country, drainage is an inherent problem. With the growth of urbanization, the increase of built up areas also causes obstruction to the natural water flow. Moreover, the volume of sullage water (kitchen, bath and wash water) from houses increases with urbanization. Sullage water and stagnant storm water being filthy and infected pose many environmental and health hazards; they need to be disposed of in an environment-friendly way. As sullage water is less polluted than sewage, it is a common practice to collect it in open road side drains and then discharge the same into the rivers or canals or in soak-away areas. Only Dhaka city has an underground storm water drainage system and the rest use open drains.

Issues and Challenges

As a result of the country being flat and concentration of heavy rainfall during the monsoons, the cities and towns are regularly flooded. The average annual rainfall is about 2,540 millimeter (mm), of which about 80 percent falls in the monsoon period from May to September. The carrying capacity of the rivers is being reduced due to siltation, causing serious drainage congestion, especially in the coastal areas. Construction of drainage systems in the urban areas is expensive and has not kept pace with urban development. This problem is compounded by the fact that many natural canals are being blocked by construction or are being filled up for housing and other purposes. Moreover, the present drainage system is not being utilized fully because of the poor O&M and the disposal of solid waste from the road into the drains by city authorities. Disposal of garbage and other wastes by the general public adds to the problem.

2.4.5 Action Points for Urban Subsector

The following action points should be taken up for the urban subsector. The action points cover: a) general actions required for all categories of urban areas; b) specific actions for cities with WASAs; and c) specific actions for city corporations and paurashavas.

A) General Actions

Rehabilitate and upgrade the system. Many of the existing pipelines are leaking and the machinery is damaged or worn out, contributing to UfW and operating inefficiencies. There is a need for greater focus on the O&M of existing schemes. The recent initiatives taken by Dhaka WASA need to be replicated; there is a need to introduce distribution zone management including the installation of bulk water meters and rehabilitation of existing sewerage and drainage systems. Service benchmarking across utilities can improve the focus on O&M and create opportunities to learn from peer utilities.

Expand the piped water supply and sanitation coverage. This will require, among others, construction of treatment plants, production wells and extension of the piped network. Water meters

are to be installed at all service connections and water sources, that is, production wells and treatment plants, and at strategic locations in the pipe network. Extension of sewer lines and improvement of wastewater treatment plants are also pressing requirements. In areas where sewer lines cannot be constructed within a short period of time, appropriate onsite sanitation needs to be used along with safe handling and disposal of sludge like setting up decentralized sewerage treatment plants specifically for the sludge collected from septic tanks and pit latrines. Further, drainage coverage needs to be extended. The low income communities need to be given special attention while expanding the services.

Increase tariff collection efficiency. For efficient tariff collection, outsourcing should be introduced in all city corporations and paurashavas with the authority to disconnect supply connections on nonpayment.

Develop customer care. Customer care and relationship should be strengthened in the paurashavas. Citizens' forums, such as the Town Level Coordination Committees (TLCC), may be instrumental in this regard. A unit could be established from where customers would receive a "one-stop-service" like complaint responses and information on bills and new connections.

Coordinate with other agencies.Coordination with related agencies, such as the Department of Environment (DOE), Bangladesh Water Development Board (BWDB) and Water Resources Planning Organization (WARPO) should be ensured for an integrated solution for water supply and sanitation including drainage through, for example, pollution control, flood protection and river dredging.

Increase community participation. Communities should be involved in designing the WSS systems, creating awareness and delivering public education on not disposing waste in drains.

B) WASA-specific Actions

Explore new water source. All three Cities having WASAs are facing the shortage of water sources, and the capacity of groundwater, in and around the cities, to meet the water demand has reached its limits. As such, the new water sources would be surface water or groundwater transported from a distance. Both cases would require high investment. The prospects for using rain water also need to be explored.

Implement the Partnership Framework Agreement for WASA. Priority should be given to implementing the Partnership Framework. A sub-SWAp for the cities with WASAs should be initiated under the purview of the SDP Implementation Framework (more in Chapter 7).

C) City Corporation and Paurashava-specific Actions

Ensure quality of services. The paurashavas and the city corporations should enter into quality service agreements with all providers of WSS services within their jurisdiction. While this will require greater separation of authority between the paurashavas/city corporations with and without WASAs and their water supply units, this will require a closer working relationship with the respective WASAs and others service providers. In all cases, the LGIs should seek to hold all WSS service providers (irrespective of their form or mode of provision) accountable for the safety and reliability of the services that they deliver to their consumers.

Practice demand management. This should be done firstly by installing water meters for all connections, and secondly by promoting water conservation, including wastage reduction inside houses.

Increase the number of connections. The small number of service connections is frustrating economies of scale principles. In many paurashavas, the full production capacity of the existing production well is not utilized. To ensure a financially viable system, the number of connections should be increased by providing good services, motivating people to take connections, and extending pipelines where necessary.

Prepare master plans. Master plans should be developed for the paurashavas that still do not have such plans. Further, it would be important to coordinate development with agencies preparing Urban Master Plans such as the UDD and the LGED.

2.5 Rural Subsector

2.5.1 Rural Service Delivery

There are mainly three large-scale service delivery systems for water and sanitation in the rural areas.

Public Sector System: The public agencies, mainly the DPHE, plan and implement water and sanitation facilities. The DPHE engages private contractors to install the facilities. The local government institutions (union parishads) also provide sanitary latrine components free of cost for the poor communities out of their ADP block allocation for sanitation.

NGO Sector System: The NGOs themselves are the "service providers,". They plan and implement schemes in close consultation with the communities. The implementation works are either carried out by the communities themselves or by the private contractor engaged by the NGOs.

Private Sector System: Individual households or buyers directly purchase tubewells and sanitation units from the market. This approach is explained in detail in the PPP section in Chapter 3.

2.5.2 Status of Rural Water Supply

Rural water supply in Bangladesh is based on groundwater sources which are free from pathogens and is generally not treated for domestic purposes. Considering cost, quality and availability, groundwater has been the preferred source of drinking water. The easy drilling of wells in the soft alluvial soil enabled millions of handpump tubewells to be installed throughout the country.

The following types of tubewell are common in the country:

i) **Shallow tubewells** with No. 6 handpumps are the most common and are used in places with high groundwater tables, within six meters (m) from the ground. The cost is low, BDT 2-5,000 per shallow tubewell;
ii) **Deep Set Pump (DSP) tubewells** (common types are known as Tara or Tara Devhead) are

installed in places where the groundwater is lower than 6 m from the ground, sometimes as low as 40 to 50 m. The cost of a DSP tubewell is comparatively high, BDT 25-40,000 per DSP tubewell; and

iii) **Deep tubewells** are installed to draw water from the aquifer at depths greater than 100 m. The cost is high, BDT 40-60,000 per deep tubewell.

In places where suitable groundwater is not available, other household or community-based technologies which are commonly known as alternative technologies are used because these are alternative to the popular tubewell technology. Alternative technologies include PSFs, dug wells and rainwater harvesting among others. Shallow Shrouded Tubewells (SSTs) and Very Shallow Shrouded Tubewells (VSSTs) are used in some pockets in the saline coastal belts to capture infiltrated rainwater at shallow depths. The tubewells and alternative technologies are also termed as water points as these supply water to a household or community from a fixed point.

Rural piped water supply is an emerging technology and is being tried out in arsenic-affected areas and in some other potential areas.

Bangladesh is mainly a flat deltaic country, the only major exception in the geo-physical characteristics is the hilly areas of the CHT located at the South-eastern part of the country. Here the hydro-geological characteristics are different and often change from one place to another. In the CHT, shallow, DSP tubewells and other alternative technologies like dug wells are used. Infiltration Gallery (IG) is also used where a spring is available. The CHT is different also in terms of the institutional set-up and social and cultural factors (discussed further in section 3.12).

Rural water supply in Bangladesh faces the following three major challenges:

- ***Arsenic Contamination:*** Bangladesh was considered to have achieved near universal coverage (over 90 percent) in the beginning of this century but it was found that about 19 percent of the handpump tubewells in the country were contaminated with arsenic. The present status, issues and challenges related to arsenic problems are described in detail in Section 3.5;
- ***Lowering of Groundwater Levels:*** The excessive lowering of groundwater levels in many parts of the country, particularly in the North-West and Central regions, is occurring mainly due to withdrawal of groundwater for irrigation. As water levels drop, the shallow tubewells in those areas are not able to yield water, causing a serious threat to the present shallow tubewell dominant rural water supply system. Details on the impact of the lowering of groundwater levels are mentioned in Section 3.3; and
- ***Hard-to-reach Areas:*** There is a large gap in providing WSS services in the hard-to-reach areas as explained below.

Hard-to-Reach Areas

Bangladesh is a flat alluvial land and generally there is an abundance of groundwater sources for water supply. However, due to geo-physical and hydro-geological factors such as frequent inundation, hilly areas and unavailability of suitable water sources, there are some hard-to-reach areas in the country where water and sanitation services cannot be provided easily, making it particularly difficult

for women, children and physically challenged persons. Table 2.10 shows the different types of hard-to-reach areas and the number of unions partially or fully located in them.[19] It is estimated that about half of the area of the total unions can be considered hard-to-reach. A brief description of these different types of hard-to-reach areas is given below.

Table 2.10: Number of hard-to-reach unions

Types of Hard-to-reach Areas	Number of Unions Partially or Fully Hard-to-Reach		
	Total	With respect to Water Supply	With respect to Sanitation
Char land	72	72	72
Beels	300	300	300
Haors	156	156	156
Exposed coastal areas and islands	107	-	107
Hills (excluding CHT)	51	51	51
Isolated areas	5	5	5
Water scarce areas	100	100	-
Total	**791**	**684**	**691**

Char lands are river islands. It is estimated that about five million people live in chars. The people and water and sanitation installations in char lands are constantly exposed to flooding and erosion.

Beels and Haors are swampy lands. In the active flood-plains of Bangladesh, there are thousands of beels of different sizes. Most of the large beels have water-logging characteristics. More than five million people including some ethnic communities live in those areas. Pit clay and clay soil of the beel areas are not suitable for conventional pit latrines due to poor permeability of soil. Apart from the problem of being flooded, the handpump tubewells are mostly of very shallow (30-60 feet) to shallow (80-120 feet) depths and are not protected from being contaminated by pit latrines or other contaminations.

The exposed coastal zones and islands are areas close to the sea and exposed to natural disasters and tidal effects. They are mostly dependent on deep tubewells. Soils are moderately permeable and the water table rises near the ground levels due to tidal effects. As such, pit latrines overflow.

Hills, other than in the CHT districts, are located in the districts of Chittagong, Sylhet, Mymenshingh and Netrokona. Due to the elevated terrain, tubewells are often not feasible. Sanitation is also a problem because of low availability of water.

Isolated areas are mostly enclaves of Bangladesh in the Indian territory, commonly called *chitmahals*, where services cannot be delivered due to problems of access and thus the people are excluded from mainstream development.

[19] Largely taken from Map of Hard to Reach Areas of Bangladesh on Water and Sanitation Services (draft), 2010 by the Water and Sanitation Program (WSP) of the World Bank. Some minor adjustments were done to separate the affects with respect to water supply and sanitation.

Water-scarce areas are those where no feasible water source, either groundwater or surface water, is available. These areas are mostly in the coastal saline zone in the districts of Shatkhira, Bagerhat and Khulna. Here the groundwater in shallow and water at deep depths is saline. River water which is scarcely available is saline as well. There are also some other areas in the districts of Panchagar, Sylhet (Jaintipur) and Chittagong (Shitakundu) where suitable groundwater is unavailable due to stony layers or other reasons. Surface water is also not available nearby.

2.5.3 Coverage of Rural Water Supply

Handpump tubewells are installed by the public sector, mostly through the DPHE, private individuals and the NGOs. The number and types of public water points are given in Table 2.11.

Table 2.11: Number of public water points

Types of Water Supply Technologies	Number	Percentage
Tube wells:		
Shallow tubewell	867,715	65.6
Deep set tubewell	182,010	13.8
Deep tubewell	237,104	17.9
Alternative technologies:		
SST/VSST	11,519	0.9
Ring well	20,049	1.5
Rainwater harvesting system	830	0.1
PSF/IG	4,111	0.3
Total	**1,323,340**	**100.0**

Source: DPHE, June 2009: Status Report.

The total number of public water points is about 1.3 million, shallow tubewells account for two-third of the total water points. The number of shallow tubewells installed by the users themselves is much more than the public ones (details in Section on PPP in Chapter 3). There is no reliable information on the number of private shallow tubewells but it is estimated to be eight times higher than the public one. The number of private DSPs and deep tubewells is estimated to be 30 percent of the public ones; and the number of other types of water points (like PSFs, ring wells and rainwater harvesting units), installed by users, is lower than the public one and is estimated to be 10 percent of the public water points. The number of water points installed by the NGOs is estimated to be 10-20 percent of the public water points. It is estimated that, in total, there are about eight million shallow tubewells and another 50,000 other types of water points in the country.

As there is no record of the total number of water points in the county, the coverage of rural water supply can only be estimated. A recent survey by UNICEF (MICS 2009) found that 97.4 percent of the rural population has access to improved water sources (without adjustments for arsenic contamination) and the actual rural population having access to safe water sources is 83.8 percent (with adjustment for arsenic contamination). The survey, however, did not consider service standards (accessibility) in terms of the number of people using a water point.

In order to assess the coverage of rural water supply, the country is divided into different categories of areas depending on hydro-geological and geo-physical characteristics and the dominant type of technologies used. The areas are as follows:

- High water table areas;
- Low water table areas;
- Deep aquifers in coastal areas;
- Arsenic affected areas;
- Hard to reach areas; and CHT.

These different categories have different types of problems, use different sets of technologies, and have different coverage levels. Due to the absence of any data on the total number of water points, the coverage levels are estimated by various methods and sources. The estimated rural water supply coverage is given in Table 2.12. Except for high water table areas and deep aquifers in coastal areas, the coverage is low. The present national rural water coverage is estimated to be about 71 percent according to the basic standard (one water point for 100 people) and 51 percent according to the improved standard (one water point for 50 people).

Table 2.12: Rural water supply coverage

Categories of Rural Areas	Percentage of Rural Population in the Category	Percentage of Coverage in the Category		Percentage of National Coverage	
		According to Bangladesh Basic Standard*	According to Bangladesh Improved Standard**	According to Bangladesh Basic Standard*	According to Bangladesh Improved Standard**
High water table areas	30	98	97	29.4	29.1
Low water table areas	27	64	32	17.3	8.6
Deep aquifers in coastal areas	15	95	54	14.3	8.1
Arsenic affected areas	19	36	18	6.9	3.4
Hard to reach areas	8	24	12	1.9	1.0
CHT	1	66	33	0.7	0.3
Total Rural:	**100**			**70.5**	**50.6**

* *Basic standard considers one water point for 100 persons.*

** *Improved standard considers one water point for 50 persons according to the National Policy for WSS 1998.*

Source: Estimated by SDP.

2.5.4 Status of Rural Sanitation

The status of rural sanitation is given in Table 2.13. Compared to very slow progress of about 1 percent per annum, there has been significant progress in the increase in rural sanitation coverage, which in 2009 was about 79 percent (basic sanitation). Credit goes to the partnership of the government with NGOs and other stakeholders, and the introduction of the Community-Led Total

Sanitation (CLTS) approach. Again when improved sanitation or hygienic sanitation is considered, the coverage is relatively low, 54 percent for JMP and 50 percent for Bangladesh improved standard.

Table 2.13: Sanitation status in rural areas

Area	Baseline Status in 2003		Sanitation Coverage Percentage in 2009		
	Total Number of Households	Percentage of Households using Hygienic Latrines	Bangladesh Basic Standard	Bangladesh Improved Standard	JMP Standard
Rural	18,326,332	28.8	78.9	49.9	54.3

The sanitation success in Bangladesh is largely credited to the CLTS approach adopted by the national government, local government and NGOs (Box 2.2).

Box. 2.2: Community Led Total Sanitation

Total sanitation in Bangladesh is defined as:

- No open defecation or open/hanging latrine use
- Effective hand-washing after defecation and before eating/taking food
- Food and water are covered
- Good personal hygienic practices, such as brushing teeth and trimming nails
- Latrines are well managed
- Sandals worn when using the toilet
- Clean courtyards and roadsides
- Garbage is disposed of in a fixed place, such as a pit
- Safe water use for all domestic purposes
- Water points are well managed
- Wastewater is disposed of through drains or in a fixed place

Source: Dr. Charles Jackson, A.J. Minhaj Uddin Ahmad, July 2009: Learning from Experience, The Coastal Belt Project, Bangladesh.

CLTS is an innovative methodology for mobilizing communities to completely eliminate open defecation. At the heart of CLTS lies the recognition that merely providing toilets does not guarantee their use, nor result in improved sanitation and hygiene. Earlier approaches to sanitation prescribed high initial standards and offered subsidies as an incentive. However, this often led to uneven adoption, problems with long-term sustainability and only partial use. It also created a culture of dependence on subsidies. Open defecation and the cycle of fecal–oral contamination continued to spread disease.

In contrast, CLTS focuses on the behavioral change needed to ensure real and sustainable improvements – investing in community mobilization instead of hardware, and shifting the focus from toilet construction for individual households to the creation of open defecation-free (ODF) villages.

CLTS was pioneered by the Village Education Resource Center (VERC), with technical assistance from WaterAid Bangladesh in 2000. In Bangladesh, CLTS is being widely practiced in partnership with local government and NGOs. The CLTS approach has also spread to other countries; today, it is followed in more than 20 countries in Asia, Africa, Latin America and the Middle East.

Sources: Institute of Development Studies at the University of Sussex, UK. http://www.communityledtotalsanitation.org/page/clts-approach; WaterAid, UK.

In the CLTS process, after the initial stages of “ignition” and adoption of safe hygienic and sanitation practices, the households rise up the “sanitation ladder” to install and use better sanitation facilities (Box 2.3).

Box 2.3: The sanitation ladder

The sanitation ladder means improvements in the technologies used and the level of services received. Sanitation may be as cheap and simple as a pit latrine or as expensive and complex as a flush toilet with septic tank or sewerage. The higher up the ‘ladder', the greater the benefits for people and the environment. A schematic diagram of a sanitation ladder in a rural context in Bangladesh is provided below. A user may skip one or more steps to move up the ladder.

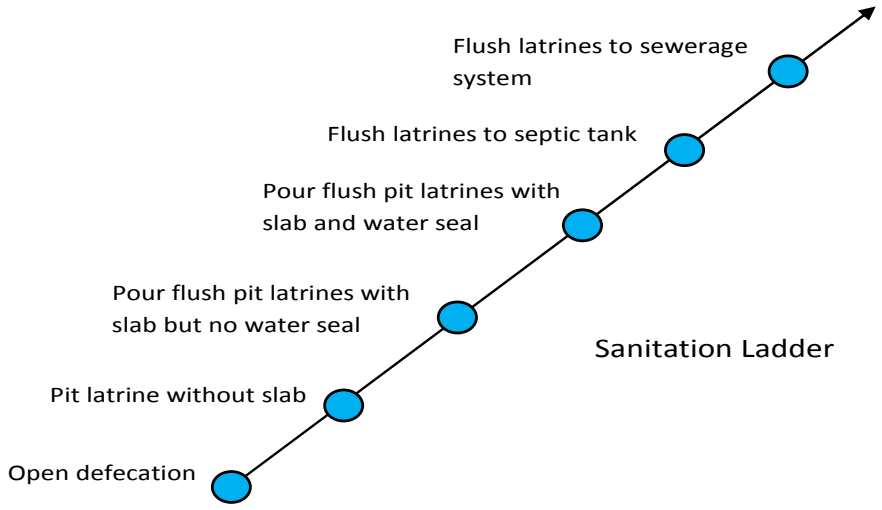


Figure 2.3 (bar diagram in left) shows the different sanitation practices in the rural areas. Although the bulk (79 percent) of the population uses basic sanitation, some use unhygienic latrines (14 percent) and some still practice open defecation (7 percent). The breakdown of the total basic sanitation (Figure 2.3 pie diagram at right) is as follows: (i) the hygienic types of latrines, that is, pit latrines with water seal, lid or flap (62 percent), (ii) ventilated improved pit (VIP), (iii) composting latrines (4 percent), (iv) flushed to septic tanks and (v) a significant portion of pit latrines with only slab (24 percent). The pit latrines with only slabs are not totally able to stop disease transmission routes. The above analysis shows that, even when there is a high percentage of sanitation coverage, the rural sanitation is still in the early steps of the sanitation ladder.

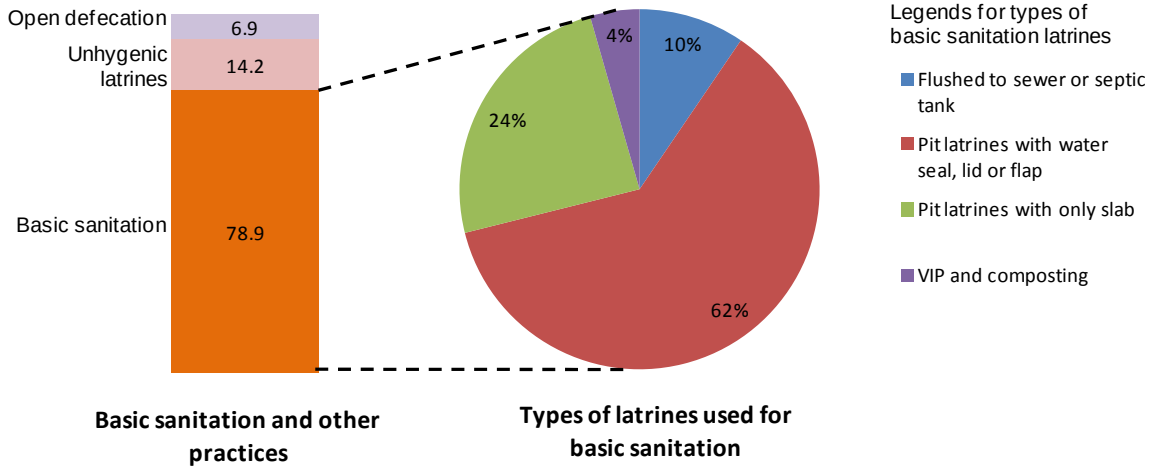


Figure 2.3: Sanitation practices in rural areas

Sustained use of the latrines is a major concern. Most latrines are single pit latrines and once the pit is filled up, a new pit is required to be constructed and the slab needs to be placed over it or be connected to it. Experience has shown that once the pit is filled up and the existing latrine cannot be used, there is a tendency of many to revert to open defecation. When comparing the number of households using a basic latrine, it is seen that 71 percent of latrines are used by single household whereas 15 percent of latrines are used by two households, and another 14 percent are used by three or more households. The pit latrines are designed for single family use and, as such, sharing latrines is not technically suitable or socially viable in the long run.

Poverty hinders the progress of sanitation. Most households sharing latrines, practicing open defecation or using unhygienic latrines are poor. The needs of the poor people must be addressed if we want to achieve 100 percent sanitation.

2.5.5 Action Points for Rural Subsector

The following action points should be followed: a) general both to water supply and sanitation; b) water supply specific; and c) sanitation specific.

A) General Action Points

Address poverty. Poverty is a common problem for the WSS. The ADP allocation to the LGIs for sanitation to the poor provides a safety net but this is not the case for water supply. A special financing mechanism needs to be created or existing mechanisms strengthened. Here the pivotal role of the LGIs would be instrumental.

Coordinate the agency activities. While there is some level of coordination between the public agencies and NGOs, particularly under development projects, it is weak in the case of the private sector which plays a major role in rural areas. It is the LGIs that need to take the lead role in coordinating local service delivery activities and in planning and coordinating the projects developed by others.

Integrate the approaches. Different approaches are practiced by different government projects and NGOs for delivering water and sanitation services and using different Information, Education and Communication (IEC) packages. Again, there are different IEC packages for different areas, such as community participation, hygiene promotion, sanitation promotion, O&M and the Water Safety Plan. However, there is a need for developing an integrated IEC package for water and sanitation including implementation guidelines (more in hygiene promotion Section 3.7)

B) Water Supply

Focus on addressing the gaps in rural water supply. Rural water supply coverage is 71 percent, according to the Bangladesh basic standard and 51 percent according to Bangladesh improved standard. Thus, wide gaps in universal coverage of rural water supply still remain mainly because of two reasons: i) problems of a similar nature in covering large areas, for example, arsenic contaminated areas (see more in Section 3.5) and areas where the groundwater level is falling (see more in Section 3.3); and ii) problems of local specific nature in covering relatively small areas, for example, hard-to-reach areas as explained earlier. These two types of areas need two different approaches to resolve their problems. While for the large areas a "blanket type" approach would be feasible, specific "tailor made" approaches are needed for the small areas with diversified problems.

Encourage the private sector to take on larger roles. Rural water supply is in a state of transition where it is switching from shallow tubewells to DSP tubewells to address falling groundwater levels in vast parts of the country. Rural piped water supply is an emerging technology. The private sector is the dominant factor in facilitating the high coverage with shallow tubewells. Thus, the private sector needs to be encouraged and supported to meet future challenges (see more in Section 3.9 on PPP). The DPHE and the LGIs may make relevant local information available such as aquifer characteristics and water quality, and government regulations, if any.

C) Sanitation

Moving up the sanitation ladder: Bangladesh is presently on the first few steps of the sanitation ladder. It is now time to move further up the ladder by paying more attention to improving the sanitation technology options through converting unhygienic latrines and latrines with slab only (without water seal, lid or flap) to hygienic ones. Simultaneously, the still prevalent open defecation must be stopped and further use of higher level technology options, such as septic tanks and double pit latrines, be encouraged.

Sanitation for hard-to-reach areas: A burning issue is appropriate technologies for the hard-to-reach areas, which remain under very low sanitation coverage. Focused programs and research and development (R&D) activities are needed (see more on R&D in Section 3.11).

Chapter 3

Water Supply and Sanitation Sector Thematic Areas

This chapter analyzes some water supply and sanitation sector-specific and cross-cutting themes, which are based on the contributions of thematic groups and consultant analysis. The remaining topics of the thematic groups are described in other chapters. An outline of the themes in the chapter is given at the beginning. For each theme, the key issues are analyzed and actions points to address those are reported.

3. 1 Sector Thematic Areas

The themes are presented in the subsequent sections of this chapter. The first five themes are specific to water resources and water quality, and the following five are cross-cutting. The CHT is considered a separate theme because of its unique administrative, social and cultural characteristics. The themes described in this chapter are as follows:

i. Surface Water Resource Management;
ii. Groundwater Resource Management;
iii. Water Quality;
iv. Arsenic Mitigation;
v. Water Safety Plan;
vi. Hygiene Promotion;
vii. Vulnerable Groups;
viii. Public-Private Partnership (PPP);
ix. Environment, Climate Change and Disaster Management;
x. Research and Development (R&D); and
xi. Chittagong Hill Tracts (CHT).

3.2 Surface Water Resource Management

3.2.1 Water Resources and Hydrological Cycle

The total water resources of the earth equal 326 million cubic miles, each equal to one trillion gallons of water. Only 2.5 percent is fresh water and 97.5 percent salt water. Almost 69 percent of the fresh water resources are tied up in glaciers and ice caps; about 30 percent is groundwater, and a mere 0.27 percent is surface water.[20]

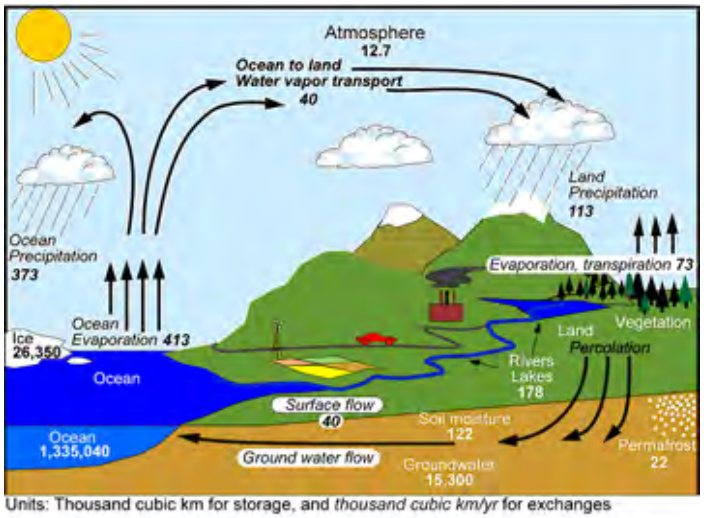
[20] http://www.ehow.com/about_5127497_types-water-resources.html

Water supply resources are of two distinct categories:

- surface water; and
- groundwater.

Surface water and groundwater resources are interconnected through the hydrological cycle. The hydrological cycle is the process, powered by the sun's energy, which continuously moves water between the oceans, the sky, and the land (Box 3.1).

Box 3. 1: Hydrological cycle



Units: Thousand cubic km for storage, and *thousand cubic km/yr* for exchanges

The hydrological cycle can be described as the physical processes which form a continuum of water movement. Complex pathways include the passage of water from the gaseous envelope around the planet called the atmosphere, through the bodies of water on the surface of the earth, such as the oceans, glaciers and lakes, and at the same time (or more slowly) passing through the soil and rock layers underground. Later, the water is returned to the atmosphere.

Source:
http://www.times.ucar.edu.highlights/fy06/dia.html

Groundwater, the dominant source of water supply, is discussed elaborately in the next section. This section briefly discusses surface water and its use for water supply. Rainwater is also briefly discussed in the context of surface water.

Surface water and groundwater are interrelated in Bangladesh. Many rivers receive a major portion of their flow from groundwater. Elsewhere, water from surface streams is the main source of recharge of groundwater. In general, groundwater flows into surface sources in the dry period and surface water enters into the ground during the monsoon.

3.2.2 Surface Water

The rivers of Bangladesh mark both the physiography of the nation and the life of the people. About 700 in number, these rivers generally flow south. The larger rivers serve as the main source of water for cultivation and as the principal arteries of commercial transportation. Rivers also provide fish, an important source of protein. Flooding of the rivers during the monsoon season causes enormous hardship and hinders development, but fresh deposits of rich silt replenish the fertile but overworked soil. The rivers also drain excess monsoon rainfall into the Bay of Bengal. Thus, the great river system remains simultaneously the country's principal resource and its greatest hazard.

Bangladesh lies across the delta of four major rivers: the Ganges-Padma, the Brahmaputra-Jamuna, the Meghna and the Teesta. This mighty network of four river systems flowing through the Bangladesh Plain drains an area of about 1.5 million sq km (Figure 3.1). These rivers and their distributaries discharge approximately 5 million cubic feet of water per second into the Bay of Bengal at peak periods. The annual sediment load of the rivers has been estimated between 1.5 and 2.4 billion tons. In total, Bangladesh has about 24,000 km of rivers, streams and canals.

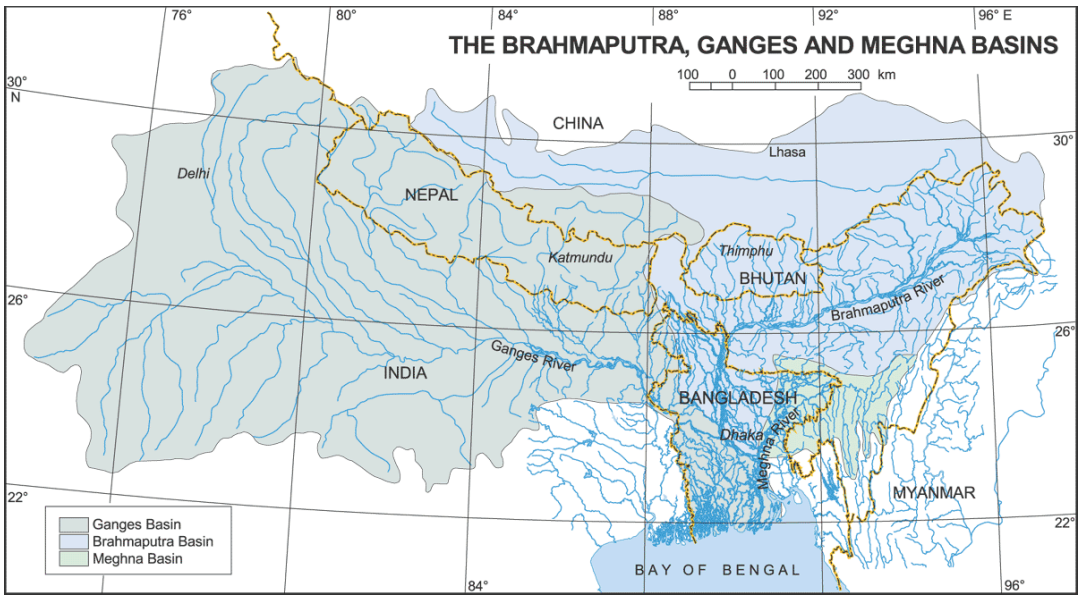


Figure 3.1: Major river systems in Bangladesh and their drainage areas

The surface water system of Bangladesh consists of the major river networks; the massive flood plains, which become inundated in the monsoon season; lakes and over thousand Beels and Haors, which are saucer-like depressed basins of a marshy character; and ox-bow lakes, which are remnants of dead rivers in the south-western parts of the country. Besides these natural water bodies, there are ponds of various sizes in each village. The total number of ponds is estimated to be 1,288,222 (BBS

2007). The total area of the water bodies is over 12,000 sq km which is about eight percent of the total land area of Bangladesh (Table 3.1).

Table 3.1: Major water bodies of Bangladesh

Type of water bodies	Water areas in sq km
Main rivers (Padma, Meghna and Jamuna)	2,174
Other rivers and canals	2,626
Dead rivers and ox-bow lakes	225
Beels/Haors/natural water bodies	1,540
Estuary	5,518
Total	**12,082**

Source: Space Research and Remote Sensing Organization (SPARRSO) Report, 1984.

Bangladesh is known as the land of plenty of water. In the monsoon season, there is too much water but, in the dry season, shortage of water creates a drought-like situation. These two extremes dominate and influence the overall planning and management of the country's water resources.

While planning the efficient use of surface water resources, including water supply, for Bangladesh, which is a lower riparian country, several parameters have to be considered. These include: i) availability of too much and too little water in different seasons as well as its erratic occurrence; ii) an intricate network of alluvial rivers carrying huge annual discharge and sediment load and unstable in nature, which causes bank erosion; iii) withdrawal in upstream areas having serious affects on the socioeconomic growth, environment and ecology, and fish habitations; iv) inland navigation blockages due to siltation; v) increased water demand for domestic, agricultural, irrigation and industrial use; and vi) increase in salinity in the coastal belt.

Use of Surface Water for Water Supply

Groundwater accounts for over 90 percent of the drinking water supply sources in the country. Unlike groundwater which mostly does not need treatment in Bangladesh, surface water always needs treatment. It is polluted by agricultural, industrial, domestic and municipal sources. The silt content during the monsoon is very high. Algae growth in the dry season in stagnant water bodies, like ponds, is high. Unsanitary practices greatly deteriorate the surface water quality. The fecal coliform concentration, an indicator of pollution due to unsanitary practices, in most surface water is between 500 and several thousand per 100 milliliter (ml). The use of surface water for drinking purposes requires an elaborate and expensive treatment process.

River water is used in large cities like Dhaka and Chittagong and in some secondary towns like Chandpur and Bandarbon in addition to groundwater, where it alone cannot meet the total water demand. In some towns like Gopalganj, Sunamganj and Pirojpur, river water is solely used as there is no suitable aquifer. Lake water (Kaptai) is only used in Rangamati. Due to rapid urbanization and increased water demand, more and more surface water is being used. For example, in addition to the existing groundwater sources, surface water treatment plants are presently being constructed to treat

and supply water from adjacent rivers in the large cities of Rajshahi, Sylhet and Barisal. With the growing urban population, the use of surface water will increase in the future.

In some parts of rural areas, such as the coastal belt, where a suitable aquifer is unavailable, the PSFs are used to treat pond water. Further, due to the arsenic problem in groundwater, alternative solutions like the PSF are being used in many parts of the country.

There are several constraints on using surface water in urban areas. Surface water is not available round the year in many parts of the country from where it can be used as a drinking water source. Further, the investment and O&M costs of a surface water system are much higher than of a groundwater-based system. Salinity is another limiting factor in the coastal districts. Industrial pollution in and around the large cities is also a major concern (more in Section 3.10 on Environment). In rural areas, there is less availability of ponds which are free from polluting activities like fish farming, bathing and washing. Moreover, there are reports of presence of some toxins[21] in pond water.

Rainwater

Rainwater is another source of surface water. In Bangladesh, rainfall varies widely, not only from season to season but also from region to region. The mean annual rainfall varies from 1,400 mm in the western part to almost 5,000 mm in the northeast and is characterized by wide seasonal fluctuations. About 90 percent of the total rainfall occurs in the period between June and September.

Rainwater is used by rainwater harvesting systems (RHSs) in some rural areas as, in those places, no suitable ground or surface water sources are available. Artificial recharge of groundwater (by rainwater) has a potential and is being tried on a pilot basis in Dhaka city by the WASA.

3.2.3 Issues and Recommendations on Surface Water

Foster a shift away from reliance on groundwater towards surface water in agriculture. This will enable safer agricultural water to be sourced from surface sources and safer drinking water to be sourced from the deeper groundwater aquifers;

Give preference to surface water sources when two or more arsenic mitigation technologies appear technically feasible, considering the feasibility of: (i) chemical and biological safety of the water; (ii) cost; (iii) social acceptability; and (iv) temporal reliability of the water source;

Consider the availability of surface water carefully in terms of factors, such as seasonal variations, possible withdrawal of water upstream, and increased salinity due to climate change in the context of the increased need to use surface water in the future, particularly in large cities;

Consider the artificial recharge of groundwater by surface water (or rainwater) in the water-stressed

[21] WHO, 2004. Pilot Study Report, May 2004: Occurrence of Cyanobacterial Toxins (Microcystins) in Surface Waters of Rural Bangladesh. WHO, Geneva: Water, Sanitation and Health Protection of the Human Environment.

areas, such as in and around Dhaka city and in Barind tracts. It is important that the present low areas like Ashulia and Mirpur around Dhaka and watershed areas near other towns need to be protected from land filling; and

Encourage the rainwater harvesting technologies as an alternative source in the rural water-scarce areas where the availability of ponds for drinking water supply (using PSF) is an issue due to competitive use for fish farming and domestic purposes.

3.3 Groundwater Resource Management

3.3.1 Background Studies

The first systematic assessment of groundwater resources was carried out by the MPO (now WARPO) during the preparation of the National Water Plan Phase-I and updated in Phase-II in 1990. The groundwater resources were reassessed during the preparation of the NWMP, calibrating groundwater levels response to irrigation development. After this period, no quantitative assessment at the regional level was carried out but there were a few local studies in Khulna.[22] Several municipality-specific studies were conducted under different water supply projects implemented by the DPHE with support from various DPs such as DANIDA[23] and JICA.[24]

The above works have provided a sound analytical basis to identify critical issues related to groundwater management and to formulate strategies to address them. These studies had been reviewed and relevant findings are reflected in the SDP.

Recently, the DPHE has started a groundwater resource assessment including mathematical modeling in 148 small municipalities throughout the country and, together with PSU, preparing a national groundwater database coupled with software for geological and chemical analysis.

3.3.2 Groundwater in Bangladesh

Groundwater from the quaternary to recent sediments is the principal source of domestic, industrial and irrigation supply in Bangladesh. The shallow alluvial aquifers are recharged through rainfall and flooding, and almost everywhere replenished each year, except in areas like Dhaka city where, due to continuously increasing abstraction, groundwater levels decline continuously. Recharge to deeper aquifers is more problematic to assess. The aquifer system can be divided into three parts:

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[22] LGED & BRGM/ ANTEA/ ARMCO, during 2005: "Municipal Services Project Groundwater Resources and Hydro-Geological Investigation in and around Khulna City".

[23] N&R/ R&H Joint Venture, Aqua Consultants & Associates Ltd. during 1992: "DPHE-DANIDA Water Supply and Sanitation Project in Choumohani and Lakshmipur Pourashava".

DANIDA also supported the Five Districts Water Supply and Sanitation Group (DPHE-DANIDA, 2001) in five separate coastal districts of Bangladesh. The five districts covered by the project are Patuakhali, Barguna, Noakhali, Lakshmipur and Feni. The project covered these five district towns and another five municipalities within those districts.

[24] JICA, 2002: "Study on groundwater development of deep aquifers for safe drinking water supply to arsenic affected areas in western Bangladesh" covering three districts, namely, Jessore, Choudanga and Jhenaidah.

an upper or main aquifer, extending to about 150 m;[25] the source of what is referred to in this report as shallow groundwater;

a deep aquifer, extending from 150 m to about 350 m; anda very deep or lower aquifer, extending below 350 m to as much as 1,600 m, about which very little is known.

The definitions of aquifers and tubewells have been a common source of confusion because of differing terminologies.

3.3.3 Groundwater Availability

Shallow Aquifer

The available recharge of the groundwater in the shallow, different demands (water supply, environment and agriculture), and its balance for different hydrogeological regions are assessed up to 2025 and summarized in Table 3.2.

Table 3.2: Usable recharge and groundwater demand

Region	Gross Area (Kha)	Usable (1) Recharge, UR, (Mm^3)	Groundwater Demands, GD, (Mm^3) (2)				Balance: UR – GD (mm^3, %)
			Water Supply	Environment	Agriculture	Total	
Northwest	3,016	12,100	539	1290	9548	11,377	+ 723 (6%)
Northeast	-	-	222	170	1357	1,749	17,066
North-central	3,569	23,100	566	637	3082	4,285	(74%)
Southeast	3,007	9,800	232	149	1158	1,584	8,216 (84%)
South-central	1,426	3,500	179	88	652	919	2,581 (74%)
Southwest	2562	5,600	289	620	4196	5,105	495 (9%)
Eastern Hills	-	-	181	-	-	181	-
Total (mm^3)	13,580	54,100	2,208	2,999	19,993	25,200	28,900
(%)			**(8.8%)**	**(11.9%)**	**(79.3%)**	**(100%)**	**(53%)**

Notes: (1) Resource Assessment by NWP-II; (2) Groundwater demand estimated by NWMP.
UR – Usable Recharge; GD – Groundwater Demand, Kha – Thousand hectares

Only nine percent groundwater is required for water supply, 12 percent for the environment, and 79 percent for agriculture. The resource availability indicates that, without consideration of water quality issues, there should be no serious regional problem of groundwater availability for water supply. However, at the subregional level, it is noted that recharge could be a constraint along the western

[25] The value of 150 m is a useful guide, but does not have precise significance, although it is the approximate limit of aquifers deposited since the Last Glacial Maximum, and is an approximate limiting depth for the occurrence of arsenic pollution. However, older and arsenic-free aquifers often occur at shallower depth.

border of Bangladesh, and especially beneath the High Barind. The lowering of groundwater in and around Dhaka city due to over-abstraction is a specific problem.

Deep Aquifer

Deep wells (150-350 m deep) were originally installed in the coastal area to avoid salinity. Survey found that only one percent of deep wells exceeded arsenic concentration over 50 parts per billion (ppb) and none greatly exceeded that concentration. Since then, deep wells have been installed at an increased rate in that area. Deep wells are also being increasingly installed further north and over large areas of central Bangladesh as a solution to shallow tubewells that draw arsenic contaminated water from the overlaying shallow aquifer. Due to these reasons, the deep aquifer is becoming increasingly important for water supply, especially the rural water supply.

The development (abstraction) of the deep aquifer is constrained by the threat of migrating arsenic and salinity, and locally constrained by boron, iron and manganese. To what extent deep groundwater is a renewable resource is a matter of serious debate, but it is certain that this resource can supply large quantities of good quality water for many years. This is best demonstrated by the deep municipal well field at Khulna which has sustained intensive pumping for more than 45 years with no evidence of either salinisation or arsenic pollution, Bureau de Recherches Géologiques et Minières (BRGM, France, 2005). The key uncertainty of the deep aquifer, however, comes from the almost complete absence of water quality and quantity monitoring of deep groundwater (as opposed to production wells).

The BRGM (2005) study, which is perhaps the only advanced modeling study of the deep aquifer, predict a major reduction in the volume of fresh water available at Khulna over a 25-year timescale. While the precise timescale of change is debatable, given the uncertainties over model parameters, the direction of change (deterioration) is inevitable, and this principle must be built into water supply planning. To do this, it is essential to have a monitoring system that provides advance warning of change. Moreover, according to DPHE data, in places like Sylhet, Barisal and Khulna, the piezometric pressure of the artisan aquifer has decreased, indicating a reduction of the recharge rate. It is also a matter of concern that there may be investigations in the southern part of Bangladesh to find a suitable deep aquifer for irrigation. If deep groundwater is considered for irrigation, the precious resource for drinking water will be depleted.

While basinal scale models[26] (for example, the Khulna study) provide a useful perspective, they are gross generalizations that are not adequate for planning water supplies to individual towns. In the short term (say, five years), priority should be given to developing sound conceptual models and implementing, progressively upgraded, monitoring networks based on these models. Without a sound conceptual model, numerical models will provide little benefit and inspire little confidence. While resources studies are in progress, a pragmatic approach to managing abstractions from deep municipal well fields will be to install and monitor observation wells between the abstraction wells and the nearest saline or arsenic contaminated groundwater body.

Another very important point to emphasize here is the very high water losses in the distribution system of urban water supply. So, where apparently nonrenewable sources of deep groundwater are

[26] Both conceptual and numerical models

used, much greater efforts should be made to minimize these losses. Unlike the situations in Dhaka, where leaking water returns to an exploited aquifer (that is, an efficiency problem), in the coastal towns the leaking water is lost forever.

3.3.4 Declining Water Levels and Rural Water Supply Technologies

Two decades earlier, when groundwater withdrawal for irrigation was not significant, the groundwater level almost all over the country (except for the CHT) was within the lifting capacity of the suction type pumps (<6 m), commonly known as No. 6 handpump shallow tubewell. Since then, there had been a sharp increase in the groundwater abstraction for irrigation and the groundwater level gradually fell. This has left many shallow tubewells nonfunctional. As a response, force-lift type handpump tubewells (initially Tara tubewells) were introduced. As the groundwater level continued to fall, different types of tubewells (Super Tara and Tara Dev Head) which are capable of drawing water from lower depths (>20 m) have been introduced. The new types of tubewells are more expensive than No. 6 shallow tubewells.

The decline in the water levels has affected the rural water supply most. The production wells that are used in urban water supply are designed to draw water from lower depths and are as affected by declining water levels caused by irrigation wells. The case of Dhaka is different; here the sharp drawdown (lowering of water level near the wells) is caused by over-abstraction for water supply.

Figure 3.2 shows the lowest groundwater levels of Bangladesh measured in 2009 by the DPHE. At present, in a large part of the country, shallow tubewells and even Tara tubewells are not yielding water, especially during the dry season. The DPHE has started the practice of using lower depth housing pipes (20 m) in the new type of tubewells to tackle the further decline of groundwater levels.

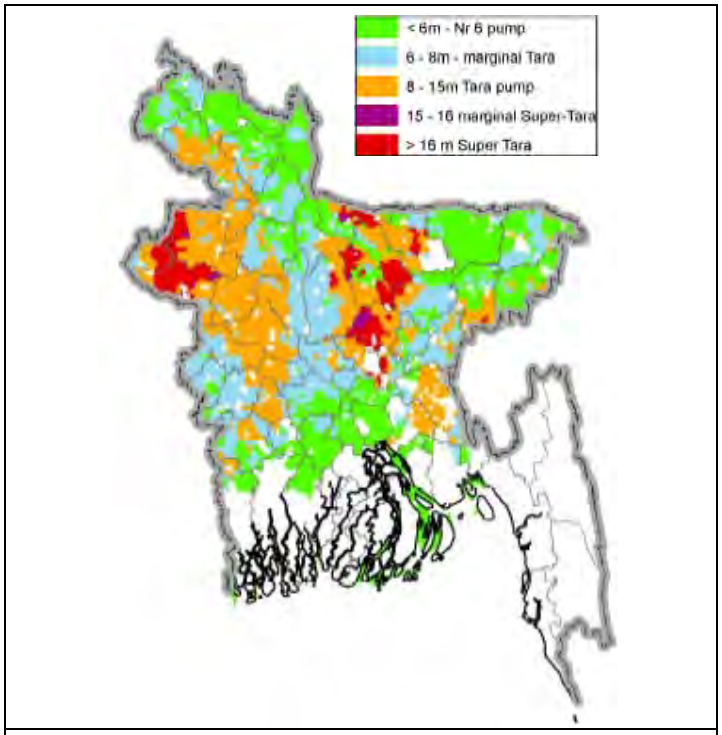


Figure 3.2: Lowest water levels depths measured in 2009 by DPHE

The falling of water levels caused by abstraction for irrigation is raising concerns among the drinking water users in many areas, such as Barind. There is a potential for this conflicting water use to become serious in the future. This is another reason for establishing a regulatory body to ensure equitable distribution of groundwater resources.

3.3.5 Other Factors Affecting Quantitative Availability

Apart from water levels, abstraction is constrained by natural gas that prevents suction pumps from working and promotes corrosion of submersible pumps.

In certain areas, in parts of Pabna and Natore (Chalan Beel), parts of Sylhet and Jessore districts, and along the Jamuna (for example, Manikganj), layers of boulders and gravel limit the drilling of deeper wells. However, this constraint could be eliminated by using the appropriate power rigs.

3.3.6 Policies and Institutions

Policies

Groundwater in Bangladesh is developed, used and managed by various agencies. Despite the existence of national policies on both water (resources) and on safe water and sanitation, there is no integrated strategy to ensure the beneficial use, protection and sustainability of this vital natural resource. Current developments are mostly carried out on an *ad hoc* basis, driven by demand.

Organizations

The main organizations involved in groundwater management are listed in Table 3.3. To this list of stakeholders must be added the private sector which, as farmers and as householders, is by far the largest abstractor of groundwater but is not formally represented in water management.

Table 3.3: Organizations Involved in groundwater management

Ministry	Department	
	Major role	Minor role
Water resources	WARPO, BWDB	
Local government	DPHE, WASAs	LGIs, LGED, RDA
Agriculture	BADC, BMDA	Department of Agricultural Extension (DAE)
Environment		Department of Environment (DOE)
Science & technology		Bangladesh Atomic Energy Commission (BAEC)
Energy & minerals		Geological Survey of Bangladesh (GSB)
Private sector		Institute of Water Modelling (IWM), (Center for Environmental and Geographic Information Services) CEGIS, Consulting Firms

The functions involved in groundwater management can be classified into five groups: i) monitoring; ii) assessment; iii) protection and regulation; iv) development; and v) R&D. An assessment of the current roles of the main organizations is set out in Table 3.4 along with recommendations for their possible future roles, as discussed further below. The roles of some agencies changed dramatically in the last two decades. Notably, Bangladesh Agricultural Development Corporation (BADC) and to a lesser extent the BWDB played a major role in installing irrigation wells but now virtually they play none. It should also be noted that no agency[27] has meaningfully controlled the activities of the private sector in abstracting groundwater, and there has been only limited control and coordination between the ministries.

Table 3.4: Present and possible future activities of government agencies involved in groundwater management or development

Functions	WARPO		BWDB		DPHE		WASAs		BADC		BMDA		GSB		LGIs	
	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future
Monitoring	X	X	X	X	X	X	?			X	X	X		X		X
Assessment	X	X	?	X	X	X	X	?	?	X	?H	X	?		X	
Development			H	X	X	X	X				X	X				
Protection and regulation	?	X		X		X	X					?				X
R & D	?	X	?	X	X	X				X	X	X		X		
Groundwater expertise	*	***	**	***	*	***	0	*	*	**	*	**	*	**		*

Notes:
X – currently or future activity
H – Historic activity
? – some or possible activity

Groundwater Expertise (present / future):
'***' – strong '**' – moderate; '*' – weak; '0' – no capacity

Table 3.4 includes an assessment of the expertise in different departments. No department is assigned a 'strong' at present and most are classed as 'weak;' however; 'strong' scores are considered necessary for WARPO, BWDB and DPHE. The principal reason for the low scores given to most agencies is staffing. None of the key agencies have sufficient qualified groundwater professionals, neither as permanent or contractual positions nor as consultants. This is perhaps the greatest constraint on developing the effective management of groundwater resources.

3.3.7 Groundwater Management Activities Not Currently Addressed

Currently, a wide range of groundwater management tasks are either not being carried out or being carried out with seriously insufficient effort. These include:

- investigation, assessment and monitoring of deep aquifers;
- arsenic investigation, assessment, monitoring and management;
- monitoring abstraction;

[27] With the possible, or partial, exception of Dhaka WASA.

- protection of groundwater quality and remediation of polluted soil and groundwater;
- augmentation of surface water bodies and ecologically sensitive wetlands;
- licensing of groundwater abstraction;
- licensing for well drilling;
- artificial recharge to reduce the impact of declining groundwater levels;
- increased groundwater reservoirs by subsurface dams;
- assessing the sustainability of current and planned practices; and
- creating the necessary legislative framework.

3.3.8 Recommendations for Groundwater Management

As a result of limited viability of groundwater, and the absence of an integrated strategy, the organizations involved in groundwater management do not have adequate capacity and many groundwater management tasks are not being carried out (see below). This calls for urgent radical reform and upgradation of groundwater management, as follows:

- Include groundwater management issues in the Draft Water Act and establish groundwater management and regulatory regime (this is elaborated in chapter 4); and
- Build capacity of sector organizations. This will include creating permanent and contract positions for groundwater professionals in key sector agencies like WARPO, DPHE, WASAs and BWDB (details are discussed in the Section on Policies, Strategies and Institutions).

3.4 Water Quality

3.4.1 Water Quality Standards and Guidelines

Standards for drinking water quality for Bangladesh were published in 1997 under the provision of the Environment Protection Act 1995, based on the 1993 WHO Guidelines for Drinking Water Quality. The 1998-99 National Hydrochemical Survey (NHS) provides a baseline for evaluating groundwater quality for the entire country except the CHT. There are 55 physical, chemical and microbiological parameters in the list of standards. Some standards are different from the WHO guideline values, and the reasons for these are not always clear. A list of Bangladesh standard parameters that are different from WHO Guideline parameters are compared and commented on in Annex 5. In addition to NHS, a number of local and regional studies of natural water quality and anthropogenic pollution were conducted.

3.4.2 Status of Water Quality

The water quality parameters may be divided as shown in Table 3.5 considering the impact on health, aesthetics and geographic spread,

Table 3.5: Categories of water quality parameters

Categories of Water Quality Parameters	Parameters
Natural parameters of concern and cover wide areas	*Arsenic, iron, manganese and salinity*
Natural parameters that are more localized or low intensity problems	*Barium, boron, uranium, nitrate and ammonium*
Anthropogenic parameters: risk associated with these parameters can be minimized through monitoring and putting up barriers against hazards	*Microbiological, agrochemical and industrial pollutants*
Health-related parameters by WHO but are not expected to occur in Bangladesh (need to be confirmed by analyzing representative samples	*Mercury, tin, radioactivity, radon and silver*

Arsenic: The health effects, at the concentrations experienced by millions, of arsenic are so great that it must be the highest priority for action in the sector. There are two distinct areas for action: i) removing exposure at contaminated water sources; and ii) protecting presently safe and new wells in at-risk areas. Arsenic, which would require the highest attention, is discussed separately in the following section.

Iron and Manganese: These are a second level of priority, driven by a combination of the aesthetic aspects of obtaining 'good' water and health-based concerns, particularly for manganese exceeding 0.4 milligram per liter (mg/l). There will be a stronger demand for reaching these goals in urban and rural piped-water supplies than at domestic tubewells, where the aesthetic aspects are more likely to be tolerated.

Salinity: The shallow aquifers in the coastal areas are thoroughly saline. Pockets of salinity occur inland, especially in Comilla and Chandpur districts.

Microbiological Contamination: Microbiological contamination is a major concern in all water supply systems of the country. The unprotected surface water sources get contaminated by human and animal waste. Shallow groundwater is also contaminated by leachate from pit latrines and solid waste dumps. Improper O&M, and unhygienic handling of water, both at water works and household levels, lead to secondary contamination. This kind of contamination is common in the communities using water points (for example, tubewells, dug wells and PSFs). This subject is discussed separately under the subsequent sections on Water Safety Plan.

3.4.3 Water Quality Monitoring

Water quality monitoring is an essential element of safe water supply to the population. The country's capacity for surveillance of water quality is also limited. DPHE, DOE and the Bangladesh Standards and Testing Institution (BSTI) are responsible for water quality surveillance; however, their capacity in terms of manpower and other logistics is limited compared to the task to be performed for the huge number of water points existing in the rural areas. The DPHE has developed a Water

Quality Surveillance Protocol which describes parameters for testing procedures/methods and sampling frequency in an ideal condition. But considering the practical situation of limited testing capacities of the existing water testing facilities and that millions of water systems are to be tested, a review of the existing protocol with a reduced number of parameters and testing frequency is needed. Importantly, decentralizing the testing responsibility needs to be done as much as possible.

Ideally, water quality monitoring in a country should have three levels of monitoring as shown in Table 3.6. At present, there is some Level-1 and Level-2 monitoring but there are no such activities or regulations for Level-1 monitoring. The obligatory quality assurance role of the water suppliers/providers as per Level-1 is highly important because the consumers' health risk lies at the water quality at this point.

3.4.4 Recommendations on Water Quality

The recommendations related to drinking water quality are as follows:

- Review and revise Bangladesh's drinking water standards, or at least those that differ from current WHO guidelines and those that have guidelines of no standards giving particular consideration to:
    - reducing the arsenic standard to 10 microgram per liter (µg/l) on a phased timescale supported by study of its effect on humans up to 50 µg/l;
    - differentiating between health and aesthetic considerations, especially for manganese; and
    - differentiating between drinking water (health) and environmental quality standards (for example, ammonia);
- Review the existing protocol and develop a comprehensive water quality testing protocol;
- Establish a water quality monitoring system, including water quality surveillance, and delineate the roles and responsibilities of local and central government institutions. This should involve the central government in regulating local governments on water quality parameters and the local governments ensuring the quality of water provision within their jurisdiction. This will require local water quality monitoring to be integrated with a national MIS; and
- Expand water testing facilities and laboratories.

Table 3.6: Different levels of water quality monitoring

Monitoring Levels	Functions	To be Carried Out by	Remarks
Level – 1	Testing water quality parameters critical to a specific drinking water supply system as an obligatory routine function of the water suppliers/ providers under the responsibility for operational monitoring	Urban areas by WASAs and water utilities of Paurashavas and City Corporation Rural areas by Union Parishads, communities and individual households	O&M of the rural water supply systems installed by public sector, LGIs or NGOs is handed over to the communities
Level – 2	Monitoring quality of drinking water being supplied by different suppliers/providers/ authorities/owners by the government as its regulatory function through some designated national organizations/agencies	This is usually termed as third party surveillance of drinking water quality. In complex settings, this may be contracted out to specialized public or private agencies or delegated to LGIs	LGD should identify the institutional mechanism through which this task will be carried out
Level – 3	Monitoring trend/change in water quality (such as increase or decrease in concentration of certain parameters and addition of new harmful organic, inorganic and other substances to) of water sources (surface and ground) by the government as its regulatory functions through some designated national organizations/ agencies	This state-sponsored monitoring function may be termed as water quality surveillance of national water resources	Government should define the institutional mechanism

Source: WHO, 2010: Internal Document on the Water Safety Plan.

3.5 Arsenic Mitigation

3.5.1 Status of Contamination

The screening of all tubewells (about five million) during 2000-2003 in 272 upazilas under DPHE/Bangladesh Arsenic Mitigation Water Supply Project (BAMWSP) (2004)[28] revealed that 29 percent of all handpump tubewells were affected by arsenic above the Bangladesh standard of 50 ppb. Subsequent DPHE/UNICEF surveys (2003)[29] of about 0.16 million wells in an additional 192 upazilas found that three percent of tubewells were affected. Considering the remaining upazilas which are presumed to be uncontaminated, the total percentage of arsenic contaminated tubewells is estimated to be around 19 percent of all handpump tubewells in the country. The arsenic contamination of tubewells in shallow depths (below 150 m) and deeper depths (above 150 m) is shown in Figure 3.3.

[28] Bangladesh Arsenic Mitigation Water Supply Project

[29] Environmental Sanitation Hygiene and Water Supply in Rural Areas Project

The population exposed to drinking water with arsenic contamination above 50 ppb was estimated to be 20.2 million by DPHE/BAMWSP (2004). It is also revealed that about half of the exposed population is living in the severest affected areas where more than 80 percent of the water sources are contaminated by arsenic. The most updated estimation comes from a survey by MICS 2009 where it is found that 12.6 percent population is still consuming arsenic-contaminated water above 50 ppb. Of this 3.1 percent of the population is drinking water with arsenic contamination higher than 200 ppb which is a huge threat to public health. If the WHO guideline of 10 ppb is considered, the population at risk increases to 23.1 percent. About 37,000 arsenicosis patients were officially recognized under the DGHS survey in 2009.

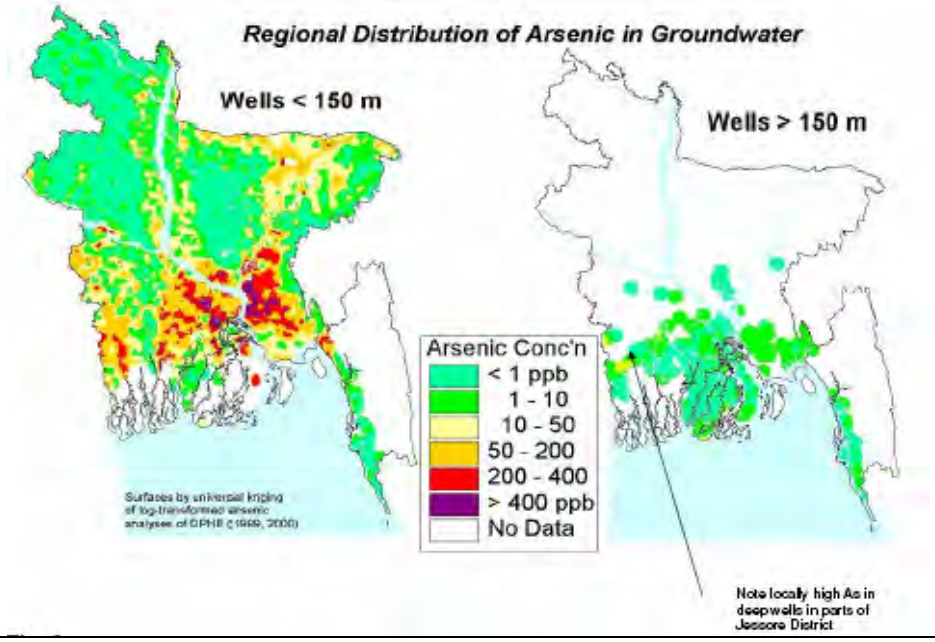


Figure 3.3: Distribution of arsenic in tubewells with depths within 150 m (left) and above 150 m (right).

As an alternative drinking water source, deep tubewells and other technologies were installed by the government, NGOs and individual families for arsenic-safe water. A Policy Advisory Note (2007) estimated that about 14 percent of the exposed population had access to some kind of arsenic-safe technology.

The situation analysis of arsenic mitigation was conducted (LGD/DPHE/JICA, 2009) covering 3,132 arsenic-affected unions in 301 upazilas and revealed a large gap between the number of installed safe water options and the areas urgently in need of safe water options. A summary of arsenic contamination and the number of arsenic patients is given in Tables 3.7 and 3.8, respectively.

Table 3.7: Number of Unions under different arsenic contamination and different safe water supply coverage

Public Safe Water Coverage	Percentage of Tubewells with Arsenic Contamination					
	<20%	20 - 40%	40 - 60%	60 - 80%	>80%	Total
<20%	143	35	51	67	188	484
20 - 40%	115	75	86	94	145	515
40 - 60%	449	140	89	68	76	822
60 - 80%	507	120	37	57	31	752
80 - 100%	213	46	21	14	12	306
>100%	149	32	22	25	13	241
No data	9	1	1	0	1	12
Total	**1,585**	**449**	**307**	**325**	**466**	**3,132**

Table 3.8: Number of arsenic patients under different arsenic contamination and different arsenic safe water supply coverage

Public Safe Water Coverage	Percentage of Tubewells with Arsenic Contamination					
	<20%	20 - 40%	40 - 60%	60 - 80%	>80%	Total
<20%	189	223	370	535	7,204	8,521
20 - 40%	428	666	935	1,034	8,888	11,951
40 - 60%	1,885	1,890	1,213	792	1,708	7,488
60 - 80%	1,682	1,049	631	1,348	509	5,219
80 - 100%	770	490	148	214	245	1,867
>100%	418	674	483	274	118	1,967
No data	18	8	0	0	0	26
Total	**5,390**	**5,000**	**3,780**	**4,197**	**18,672**	**37,039**

3.5.2 Lessons and Issues on Arsenic Mitigation Activities

Over the last decade, many programs have been initiated by the government, the donors and the NGOs. The screening of some five million wells in 272 upazilas was perhaps the most remarkable achievement but, with respect to arsenic mitigation, the achievements are below expectations. Some key lessons and insights that emerged from the experience of those programs are:

- The concepts of 'safe water' and the issue of investigation of risk substitution have evolved over time. Many exposed people have switched to nearby safe wells or have reinstalled private wells at lower depths which they believe to be safe;
- Deep wells accounted for more than 80 percent of arsenic mitigation interventions by government projects as well as those by NGOs. These deep aquifers are not properly assessed in terms of renewable yield and long-term risk of pollution by salinity and arsenic. To date, this solution has been the most popular and cost-effective, but very little has been done to monitor its status and provide warning of deleterious trends. This

deep aquifer resource needs legal protection to ensure its beneficial use. However, no progress has been made in either creating a Groundwater Act or modifying the Draft Water Act to take into account the needs of arsenic mitigation;

- Dug wells and pond water are generally not contaminated by arsenic, but they carry microbiological risks.[30] Therefore, these technologies need to be properly protected from pollution and maintained;
- Marketing of arsenic removal technologies is being regulated through the Bangladesh Council of Scientific and Industrial Research (BCSIR). To date, six technologies (Sono, Read-F, Alcan, Sidko, Nilima and Shodesh) have been issued provisional licenses. An evaluation of the technologies pointed out that there continues to be uncertainty on the replacement of arsenic absorbing media as there is no effective and sustainable after-sales service arrangement;[31]
- Rural piped water systems have had mixed success. Most of the systems are using arsenic-free groundwater, and a few systems are using surface water. A review of 120 schemes[32] shows that about half are not functioning because of poor O&M and inadequate institutional settings;
- Laboratory facilities of DPHE have been enhanced significantly, but the benefits are yet to be realized. Trained staff has been a major obstacle. Field test kits have been improved and used by LGIs and communities to test wells. Developing a locally-manufactured arsenic field test kit would be necessary to spread the system of field test kit at the local level. At present DPHE and WHO-Bangladesh are working to develop such a low cost test kit for arsenic measurement; and
- Although a huge amount of data has been generated, data management and dissemination have been poor. The National Arsenic Mitigation Information Center (NAMIC) created a database of the 5 million wells tested by BAMWSP, but did not collect other data, and NAMIC ceased operating when BAMWSP closed. The Arsenic Policy Support Unit (APSU) continued to disseminate data until its closure in 2006. Comprehensive database systems are being developed by DPHE and PSU.

A large number of activities took place in the health sector in the diagnosis and treatment of patients, and in epidemiological research. Public awareness about the health effects of arsenic has risen remarkably all over the country. In the agricultural sector, a major change in risk perception has taken place. Important research has been conducted, but very little action on agricultural mitigation has taken place. The water resources case is similar.

3.5.3 Recommendations on Arsenic Mitigation

The recommendations for arsenic mitigation are to:

- support the local initiatives to promote the testing, marking and switching of wells where feasible as the lowest cost mitigation option;
- prepare a separate Implementation Plan for Water Supply under the Arsenic Policy of 2004 and introduce mechanisms to improve coordination. This issue is elaborated in Chapter 5;

[30] APSU and ITN-BUET, 2005: The dangers of substituting arsenic for microbial risks have been spelled out in the Risk Assessment of Arsenic Mitigation Options (RAAMO).

[31] DevConsultants Ltd., December 2009: Final evaluation of the Pilot Project for the Water Safety Plans for Arsenic Removal Technologies. Prepared for DPHE and Ontario Centre for Environmental Technology Advancement (OCETA).

[32] DPHE and JICA, September 2008: Evaluation of the Performance, Village Piped Water Supply System (120 schemes).

- set priorities for specific areas to be addressed. These will include, as identified by LGD/DPHE/JICA, 2010, the 188 unions with very high arsenic contamination and very low safe water coverage and 325 unions with high arsenic contamination and low safe water coverage;
- implement the dedicated arsenic mitigation project in the first phase of SDP to address the very high and high arsenic contaminated areas having low safe water coverage;
- carry out a deep aquifer management study. This issue is discussed in Section 3.3 on ground water management;
- conduct R&D on subjects such as safe disposal of arsenic-rich sludge and in-situ (subsurface) arsenic removal (see more in Section 3.11 on R&D);
- carry out a preliminary survey[33] to determine the suitable option for a given location. Different types of field surveys (for example, test boring, water quality, water level) and data analysis are necessary for each different options; and
- facilitate community development through the LGIs.

3.6 Water Safety Plan

3.6.1 Need for Safety of Water

The high levels of WSS coverage in Bangladesh have not necessarily been reflected in the public health and well-being of the population. The disease burden due to the use of unsafe water or inadequate supply of safe water is alarming. Diarrhea, dysentery and pneumonia still remain the main causes of deaths of children in the country. Nearly 62 out of 1,000 children under five die each year (MoHFW, 2006); children suffer from three to five episodes of diarrhea each year, for two to three days and sometimes more than two weeks resulting in severe dehydration and malnutrition which may cause death. On an average, 188 per 1,000 people suffer illnesses of which most are attributable to unsafe water and poor sanitation. About 20 million people drink water with arsenic with more than 0.05 mg/l and 50 million more than 0.01 mg/l.

Groundwater, which accounts for nearly 90 percent of water sources in both urban and rural areas, is regarded as microbially safe and thus piped water systems and handpump tubewells yield microbially safe water. When surface water is used, treatment plants are needed to purify the water. However, water samples from many piped water systems and tubewells are found to be microbially contaminated. A study carried out by the International Training Network (ITN)-Bangladesh and DFID found that 29 percent of the shallow tubewells and nine percent of deep tubewells are contaminated with bacteria. The main factor that led to contamination was poor maintenance of tubewells and their surroundings and poor hygiene practice (Risk Assessment of Arsenic Mitigation Option, 2005). Moreover, safe water obtained from tubewells or service connections in case of piped water systems may be contaminated during collection, carrying and in-house storage.

The above problems emphasize the need to adapt a holistic plan to ensure that the people are actually consuming safe water and the desired health benefits are achieved.

[33] LGD and JICA, November 2008: “Sustainable Arsenic Mitigation under Integrated Local Government System in Jessore”

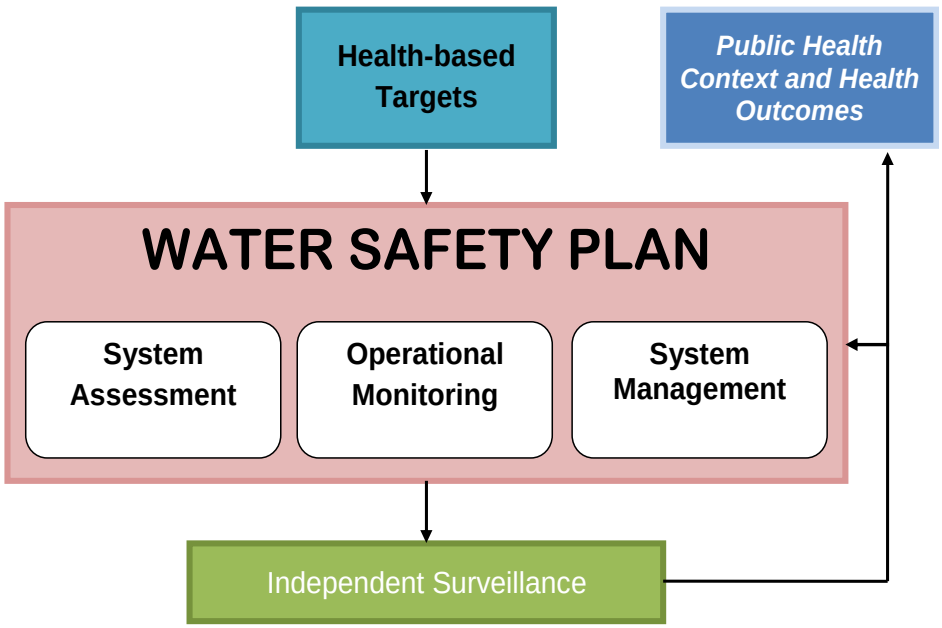
3.6.2 Concept and Practice of Water Safety Plan

> The Water Safety Plan is different from the traditional O&M of water supply systems because it has a broader outlook and addresses safety of drinking water, right from protecting the water source to hygienic in-house handling through continuous monitoring, preventive maintenance of the water supply systems, and promoting hygiene practices.

The Water Safety Plan is a holistic concept for ensuring safety of water. It can be defined as a management plan to secure drinking water safety from the water source to the point of consumption through continuous monitoring and preventive maintenance of water supply systems. The Water Safety Plan is implemented by using safety measures at various steps of the water supply system: minimizing contamination of drinking water sources, removing or reducing contamination during water treatment, preventing contamination during water distribution and properly collecting, and in-house handling by users.

The Water Safety Plan works under a framework, namely, the Framework for Safe Drinking Water (WHO, 2004) which consists of establishing health-based targets, implementing the Water Safety Plan to meet the health-based targets, and setting up a surveillance system (see Box 3.2).

Box 3.2: Framework for safe drinking water



- **Health-based targets**: Health-based targets are established in the context of public health. There can be various types of targets such as reduction in disease incidence (health outcome targets) or removal level of microbiological contamination by treatment facilities (performance targets).

- **Water Safety Plan:** The Water Safety Plan has three major components:

  - ***System assessment*** to determine whether the drinking water supply chain (up to the point of consumption) as a whole can deliver water of a quality that meets health-based targets.;
  - ***Operational monitoring***: Identifying control measures in a drinking water system that will collectively control identified risks and ensure that the health-based targets are met. For each control measure identified, an appropriate means of operational monitoring should be defined that will ensure that any deviation from the required performance is rapidly detected in a timely manner; and
  - ***Management plans*** describing actions to be taken during normal operation or incident conditions and documenting the system assessment, monitoring and communication plans, and supporting programs such as training.

- **Surveillance**: A system of independent ***surveillance*** that verifies that the Water Safety Plans are implemented properly and effectively.

Bangladesh is one of the frontline countries in this region that made an early response to WHO's initiative on the Water Safety Plan in 2004. The introduction of the Water Safety Plan started with

disseminating its concepts and approaches through consultative meeting and workshops on water quality management in 2004. Subsequently, a guiding framework was agreed on by the stakeholders and Water Safety Plans were developed for rural water supply technologies, the urban piped supply system (groundwater source) and arsenic removal technologies. After development of these models, Water Safety Plans were field tested through a number of pilot projects between 2005 and 2007. Considering the rural Bangladesh context, simple pictorial tools were prepared for the use of rural users. Different surveillance tools like sanitary inspection and water quality monitoring methods have been prepared and are being tested.

The DPHE and several NGOs have so far piloted the Water Safety Plan in 32 rural communities and six urban areas to test the practical application under different conditions. The results of those pilots are positive and have set the ground for scaling up the plan at the national level. A Working Document (No. 20) on the Water Safety Plan has been prepared.

At present, a framework for water safety has been prepared at the initiative of the PSU, LGD. Under this task, the framework components such as health-based targets, Water Safety Plan, and surveillance protocols are being prepared in the light of the national context. Until today, health-based targets and the surveillance protocol have already been drafted through a number of consultation meetings with relevant sector experts. The framework has been presented before the National Forum meeting and approved by the Forum.

3.6.3 Issues and Challenges

The main issues and challenges related to implementing the Water Safety Plan at the national level are:

- High scale of activities. There are about 10 million handpumps, of which the majority have been installed by the users themselves. The scale in urban areas is equally challenging for six metropolitan cities and 308 paurashavas;
- Adequate institutional capacity. The institutional capacity needs to be developed to scale up the Water Safety Plan at the national level. At present, there are a much limited number of trainers who can train the sector for large scale application. A good number of pilots had been conducted in rural areas which provide a strong basis for scaling up but the urban experience is limited;
- There is also a need for further dissemination of the benefits of the Water Safety Plan to national stakeholders, particularly the paurashava authorities;
- Contamination of shallow tubewell water by arsenic is another challenge. As an arsenic mitigation measure, some alternative technologies are being provided for those vulnerable to microbial contamination. This means risks are shifting from chemical to microbial but are not eliminated; and
- There is a need for further knowledge related to specific application of the Water Safety Plan in the Bangladesh context, such as relocation of latrines to maintain a safe distance between a latrine and the water source.

3.6.4 Action Points on Water Safety Plan

To address the challenges of implementation of the Water Safety Plan at a large scale, a scale-up strategy is required. Such a strategy was drafted in 2009 with the support of WHO-Bangladesh. The salient features of the strategy are:

- **Advocacy and awareness raising**: There exists a reasonable level of awareness at the policy level but the benefits need to be disseminated at the operational levels. It is suggested that the IEC materials, such as simple booklets, should be prepared for paurashava mayors and officials, and the rural users. The handpump sellers may be provided with and encouraged to give Water Safety Plan leaflets to the buyers. It is also suggested that the Thematic Group on the Water Safety Plan and Water Quality should be engaged to promote the Water Safety Plan and to establish a network of professionals;
- **Capacity building in sector institutions:** The Water Safety Plan training courses organized by ITN-Bangladesh University of Engineering and Technology (BUET) can be further strengthened from where the sector will get trainers and master trainers from different government organizations, NGOs, DPs and academic institutions. In turn, all these organizations are to transfer the concept and skills gradually down the line up to the grassroots level. It is suggested that a pool of master trainers and trainers should be created. The methods and tools developed for the Water Safety Plan, like the surveillance protocol, should be refined. The capacities and outreaches of water testing laboratories and field testing facilities need to be increased. In case of rural water supply, the LGIs will be involved and, in case of urban areas ,the community will be involved; and
- **Scaling up and mainstreaming:** The scaling-up strategy would include carrying out more demonstrations of the Water Safety Plan particularly in the urban areas and incorporating the Water Safety Plan in the ongoing and new development projects. In parallel, Water Safety Plan activities need to be synchronized and integrated with the national monitoring system and with the proposed regulatory framework.

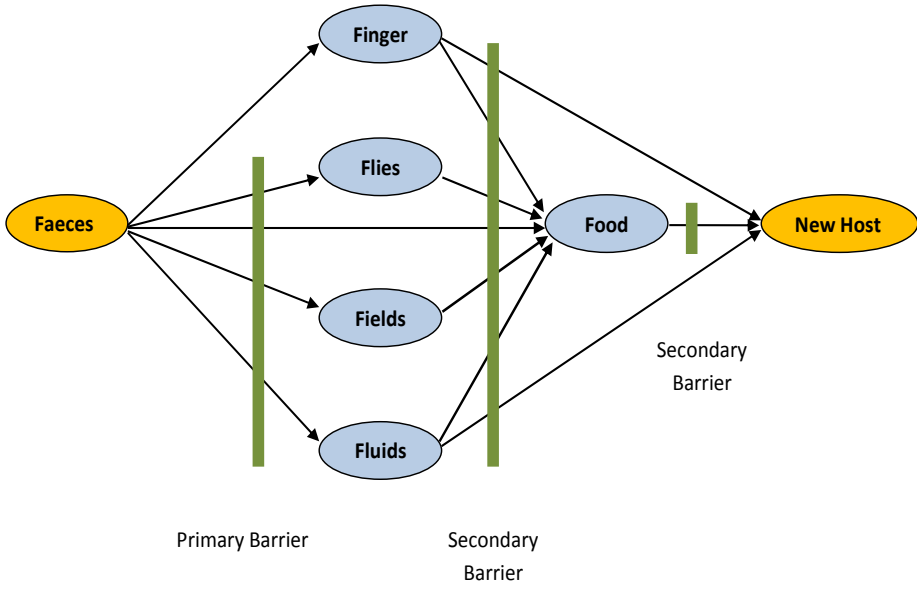
3.7 Hygiene Promotion

3.7.1 Importance of Hygiene Promotion

Over the past decades, significant improvements were made in improving access to water and sanitation. Yet the impact of these improvements in terms of health benefits has been modest. Although the mortality rate has fallen, thanks to the improved access to water and sanitation facilities and improved home management of diarrhea such as Oral Rehydration Treatment (ORT), the incidence of water-borne disease is high. The under-five mortality rate in Bangladesh was 65 deaths per 1,000 live births in 2007. On average, 188 persons per 1,000 suffer illnesses of which most are attributed to unsafe water and poor sanitation. These facts clearly show that, despite improvement, the population, particularly children, continue to be exposed to water and sanitation related diseases. In other words, only the physical facilities have not been effective in reducing the transmission of diseases. The path of transmission of water and sanitation related diseases, commonly known as fecal-oral routes, is shown in Box. 3.3.

Box 3.3: The F-diagram of fecal-oral disease transmission

All diarrheal diseases, including typhoid and cholera, and most intestinal worms (except hook worm), are classified as fecal-oral. The most common cause of diarrheal diseases is pathogens (disease causing microorganisms like bacteria and viruses). These pathogens are transmitted from the feces of a host through a variety of different possible routes and ingested by a new host, as shown in the F-Diagram below.



In the above diagram, the primary barrier is sanitation and the secondary barrier is hygiene promotion. It would have to make hygiene promotion much simpler if the fecal-oral route could be effectively broken by sanitary latrines and hand washing. However, it is extremely difficult to prevent pathogens from entering the local environment and thus it is just as important to reduce the number of potential sites where bacterial growth can occur, and limit the risk of cross contamination, particularly were the risk of ingestion of pathogens is high. Hand washing practices, particularly before food preparation and eating, and after going to the latrine or cleaning a child's bottom, is important in limiting fecal-oral disease transmission as well as practices related to storage of prepared food and washing of dishes and utensils.

Source: E.G. Wagner and J.N. Lanoix, WHO Monograph series No. 39, WHO Geneva, 1958: Excreta disposal for Rural Areas and Small Communities.

The domains of hygiene behavior that may affect disease transmission are:

- disposal of human feces;
- selection, use and protection of water sources;
- water and personal hygiene;
- food preparation and handling; and
- domestic and environmental hygiene.

Effective hygiene promotion reduces risky hygiene practices and conditions for the women, the children and the men. Hygiene promotion can broadly be defined as a wide range of actions that encourage breaking the chain of disease transmission. Thus, the major developmental challenge for the country is to match the availability of water and sanitation facilities with hygiene promotion to effectively reduce the transmission route of water and sanitation related diseases.

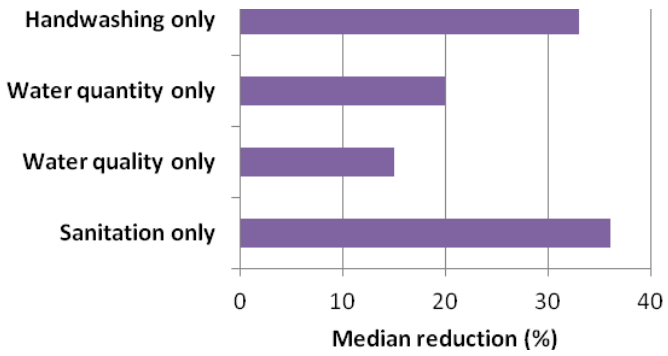


Figure 3.4: Effectiveness of hardware and hygiene interventions in reducing diarrhea morbidity[34]

Combating diarrhea is usually the prime reason for investing in water and sanitation improvements. However, it is the combination of improved water and sanitation facilities, and good hygiene that contributes most to reducing diarrheal disease, as is apparent from the fecal-oral transmission route. Figure 3.4 illustrates the effects of water and sanitation hardware and hygiene intervention in reducing diarrhea.

3.7.2 Hygiene Promotion in Bangladesh

The link between safe water supply and diarrheal diseases had long been recognized. This was the main reason for investments in water supply in the 1970s. The water decade of the 1980s witnessed a change in approach as it was becoming increasingly obvious that water supply alone was not creating the expected health impact. Sanitation programs, such as Village Sanitation Programs implemented by the DPHE, started to emerge with a component of hygiene education. Emphasis was placed on education; people were educated on the transmission route with the expectation that, with this knowledge, they would change their behavior to live a healthy life. The 1990s saw further advancement in sanitation and hygiene. Towards the end of the decade, participatory approaches, mainly through the NGOs, started to take over the "instructive" educational approach. Large-scale social mobilization projects were implemented. In the "Patgram Experiment," one upazila achieved 100 percent sanitation; one of the main factors for success was the involvement of the LGIs and the strong leadership of the Upazila Nirbahi Officer (administrative head of Patgram Upazila).

[34] Sandy Cairncross and Vivian Valdmanis: Water Supply, Sanitation and Hygiene Promotion – Disease Control Priorities in developing Countries. (http://www.ncbi.nlm.nih.gov/bookself/br.fcgi?book=dep2&part=A5898).

Hygiene means the practice to keeping oneself and one's surrounding clean to prevent illness or the spread of diseases.

Hygiene Education means exchanging information among people to increase knowledge.

Hygiene Promotion means the process of changing or developing the behavior positively.

In the decade of 2000, the focus of the sector shifted from water supply to sanitation; it also saw dynamism in hygiene promotion. The new CLTS approach evolved through which sanitation and hygiene promotion of the entire community was considered. The CLTS was initiated mainly by the NGOs, such as WaterAid, Village Education Resource Center (VERC), and NGO Forum for Drinking Water Supply and Sanitation. The government initiated the Sanitation Campaign in 2003 and Bangladesh experienced a sharp increase in sanitation coverage, from 33 percent in 2003 to 80.5 percent in 2009 by the Bangladesh basic sanitation standard (see Table 2.3 for definition of basic standard). Some donor-supported development projects (such as the Hygiene, Sanitation and Water Supply Project (HYSAWA) supported by DANIDA, and the Sanitation, Hygiene Education and Water Supply in Bangladesh (SHEWA-B) supported by UNICEF and the DFID) started to use hygiene promotion as the backbone of water and sanitation intervention. It was also realized that a longer project cycle was required for hygiene promotion than that for water and sanitation. During the end of the decade, the Water Safety Plan (see detailed in Section 3.6) which contains educational aspects on proper maintenance of water supply facilities and handling of water was introduced. Some large projects like the BRAC Water, Sanitation and Hygiene (WASH) Program integrated water supply and the Water Safety Plan with sanitation and hygiene activities. School sanitation was recognized as an effective means of hygiene promotion because children are more likely to change and schools are effective as an ideal communication channel. In the South Asian context, including Bangladesh, UNICEF has launched a successful behavioral change campaign including hygiene promotion, called Meena, for children (Box 3.4).

The MoHFW is also active in hygiene promotion. In each ward under the unions, there is resident staff called Health Assistant. They visit the homes of the local people to provide primary healthcare services including hygiene promotion and collection of routine health data. However, their involvement in the water and sanitation programs is limited; they attended some training programs for arsenic mitigation.

The above developments on hygiene promotion have occurred over a long period of some 30 - 40 years; however, a common approach towards hygiene promotion to be followed by all stakeholders and projects is absent.

Box 3.4: Meena Demonstrates an effective communication tool for hygiene behavior change in South Asia

Meena is the enchanting heroine of an animated film series produced by UNICEF a decade ago in South Asia. The films are part of a package of communication materials promoting the status of the girl child in this region. Animation was thought to be an effective and accessible way to reach children, through fun

In *Meena's Three Wishes*, Meena dreams of a magic genie that will grant her three wishes so that everyone would be healthy and never again get sick from poor sanitation and unsafe water. When Meena wakes up, she realizes that she must make her dream come true. With the help of her brother, Raju, other children in the village, and Mithu, her pet parrot, Meena convinces people to build and use latrines, to use safe water and to wash their hands to stop the spread of germs and disease.

In Bangladesh, there is universal awareness of Meena and 95 percent of the people know the Meena television series. In a survey conducted in 2004, respondents universally opined that education was the most important topic of the Meena Communication Initiative, followed by early childhood care and gender related issues. Over 66 percent children and adolescents believed that their parents sent them to school after watching Meena. Meena burst onto a world which was unfamiliar with cartoons but more particularly unfamiliar with a South Asian girl cartoon who would tackle some of the big problems facing girls throughout the region. For many she was, and still is, the role model who can lead the way. She reaches millions of households and, for many, she is a real person who is struggling to find her way in the world. UNICEF Bangladesh has even received calls from small children who ring to ask whether they can speak to her.

School teachers in Gujarat and Maharashtra in India admit that the Meena Campaign has been quite a hit with the village girls who remain ever inspired by her stories of educating girls, practicing good hygiene behavior like using soap for washing hands, giving ORS to children suffering from diarrhea, and so on. They also agree with one of the Meena stories that both boys and girls need the same type and level of nutrition.

Source: Gurinder Gulati and Vidya Kulkarni, UNICEF, India, 2007: Meena*; Children enjoying the Meena story being enacted by their classmate in Kaprada primary school.*

3.7.3 Issues and Effectiveness of the Hygiene Promotion Programmes in Bangladesh

There has been limited study in Bangladesh on the impact of hygiene promotion. After about 15 months of intervention, in the SHEWA-B[35] project, there was only marginal reduction in diarrhea among the children and, surprisingly, the incidence is similar in both the control and the intervention areas (12 percent in the last two days and 15 percent in the last 14 days). It was also observed that the self-reported results of hand-washing (varying from five percent to 24 percent) were consistently three times or (varying from 45 percent to 71 percent) higher than structured observation results. In

[35] DFID, International Centre for Diarrheal Disease Research in Bangladesh (icddr,b) and UNICEF, 2009: SHEWA-B Health Impact Study Progress Report .

the BRAC WASH Program,[36] compared to baseline data, an average reduction in self-reported cases of water and sanitation borne diseases after three years of intervention was found 30 percent. The knowledge in appropriate hygiene behavior is high (97 percent) but appropriate hygiene practices are only 60 percent after about three years of intervention.

These two studies support international experiences that sanitation alone (over 90 percent in both the cases) had limited health impacts (also see Figure 1) unless it is supported by hygiene promotion. Again, both studies show that there is a gap between the knowledge level and actual practice which might explain low health impacts. This assumption is supported by the Formative Research conducted by the London School of Hygiene and Tropical Medicine (LSHTP) with UNICEF support in June 2010. The research found that, though many projects supported by DPs were promoting hygiene, the result remains low. People do not like to listen to germ-related health messages; and the hygiene promotion activities in Bangladesh are germ-based and adult-oriented.

The translation of knowledge into actual behavior is dependent on a "Life-Skill" process which undergoes the steps of Knowledge, Skill and Attitude (KSA), as explained in Box 3.5.

Box 3.5: Life-skills on hygiene

Focusing on changing people's hygiene behavior is aimed at strengthening the existing "good" behavior and changing unhygienic behavior. To make sure that all aspects that contribute to healthy hygiene behaviors are being addressed and applied, hygiene promotion should focus on three aspects: knowledge, skills and attitudes or KSA. Developing the KSA is sometimes called developing "Life-Skills" on hygiene promotion.

Knowledge is receiving practical and theoretical information on hygiene and working on the understanding thereof.
Example: All mothers/fathers know that illnesses, such as diarrhea and worm infections, result from poor hygiene practices like not washing hands with soap after visiting a toilet.

Skills are practical skills to carry out specific hygiene behaviors.
Example: Children know how to wash hands to avoid illness and infection. Or children avoid contamination with solid waste and help to bury or burn it.

Attitude or practice depends on personal preferences on hygiene, and someone´s judgments that influence one to act or respond to an unhygienic situation.
Example: Adolescents want to keep themselves clean and healthy with no or few stimulation from adults. Or feel responsible and confident to help others, particularly younger children, to practice good hygiene.

[36] BRAC WASH Program Third Mission Report, May 2010.

A review of BRAC WASH Program shows that present methods like cluster meetings do not effectively changes behavior. These meetings focus on “knowledge” and a few on change of “attitude.” It is a problem motivating people to participate in meetings about a subject they already know. On the other hand, people also receive hygiene messages from schools, national motivational programs on television and radio, press, parents and peers. Other projects have similar experiences.

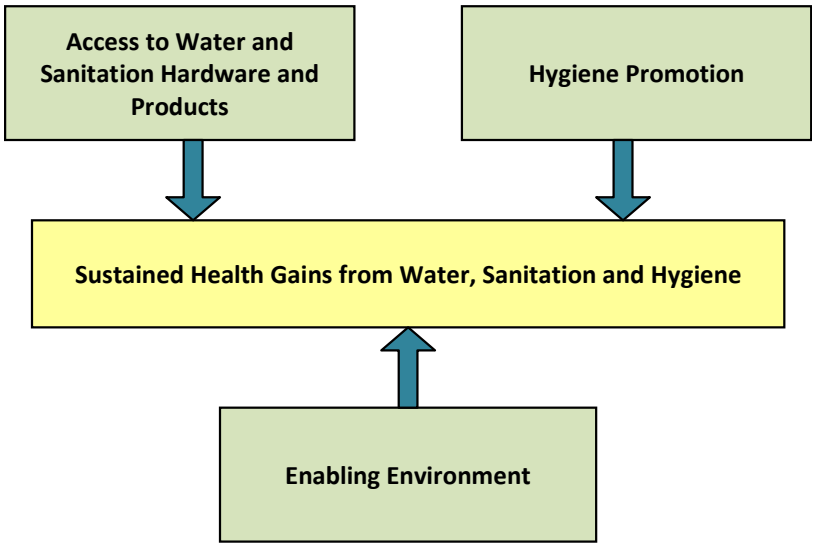
Hygiene promotion is interrelated with water and sanitation. For example, for washing hands one would need easy access to water. The health benefits of hygiene promotion are best achieved when it is combined with water and sanitation interventions. Box 3.6 shows a framework for sustained health benefits where a combined approach of water and sanitation hardware, hygiene promotion and an enabling environment is needed. Such an approach is only partially being adapted in some projects in Bangladesh.

3.7.4 Water, Sanitation and Hygiene in School

WASH in School that combines improved sanitation and hand-washing facilities with hygiene education in schools can improve the health of children for life and can promote positive change in communities.[37] Teaching children the importance of hand washing and other good hygiene habits promotes knowledge and positive behavioral change, especially when the schools are equipped with an adequate number of safe latrines, and sufficient water and soap for washing.

[37] Dillingham and Guerrant, The Lancet, Vol 363, January 10, 2004: Childhood stunting: measuring and stemming the staggering costs of inadequate water and sanitation.

Box 3.6: A framework for sustained health benefits from water, sanitation and hygiene promotion



This comprehensive approach was developed through an extensive consultation process by several international agencies. The Framework suggests the integration of three core components:

Improving Access to Water and Sanitation "Hardware": This includes water supply technologies, improved sanitation facilities and household technologies, and materials such as water storage containers, in-house water treatment units, hand-washing devices and soap.

Promoting Hygiene: The activities would include behavioral change communication, social change through social mobilization, social marketing, community participation and advocacy.

Strengthening the Enabling Environment: This typically takes the form of one or more of the following activities: policy improvement, institutional strengthening, community involvement, financing and cost-recovery activities and cross-sector and public-private partnerships

Source: EHP, UNICEF/WES, USAID, the World Bank/WSP and WSSCC, Joint Publication 8, May 2004: The Hygiene Improvement Framework - A Comprehensive Approach for Preventing Childhood Diarrhea. (www.ehproject.org/pdf/Joint-Publications/JP008-HIF.pdf), and
Merri Weinger of Environment Health, at USAID, 2010: Scaling Up WASH for Health and Development. A presentation for

Investment in school sanitation and hygiene education is important for two main reasons. Firstly, access to sanitation facilities is a fundamental right that safeguards school children's health and dignity. Secondly, early childhood is the right age to develop hygiene-related appropriate behavior. The benefits of WASH in Schools are elaborated in Box 3.7.

Box 3.7: Benefits of WASH in Schools

WASH in Schools will enable students to:

- be more healthy;
- perform better at school;
- positively influence hygiene practices at their homes among their family members and the wider community;
- learn, observe, communicate, cooperate, listen, and make and carry out decisions about hygienic conditions and practices for themselves, their friends and their younger siblings whose hygiene they care for (skills which they will also be able to apply in other aspects of life);
- change their current hygiene behavior and follow better hygiene practices in the future when they likely will be parents, teachers, health staff or other workers themselves;
- learn about menstrual hygiene and physical and emotional changes during puberty, which will encourage girls to come to school during menstruation and avoid menstrual odor, discomfort and potential urinal and vaginal infections; and
- practice equal division of hygiene-related tasks (for example, cleaning of toilets, fetching and boiling water, taking care of sick people).

Source: UNICEF (condensed from Working Document 12, Annex 1).

The sanitary conditions of schools in rural and urban areas in Bangladesh are often unacceptable, creating health hazards and other negative impacts; thus schools are not safe for children. Although water and sanitation facilities are recognized as fundamental for hygienic behavior and children's well-being, in practice, the sanitary conditions in most schools are grossly inadequate.

A study on 4,333 schools in the GoB-UNICEF project (2002-05) area showed that there were, on average, 246 students and four teachers per school. There were no water sources in 19 percent schools; non-functional water sources in 28 percent schools; and functional in 53 percent schools. There were no latrines in six percent; non-functional latrines in 13 percent; one functional latrine in 25 percent; two functional latrines in 44 percent; and three or more in 12 percent schools; 46 percent of schools had separate latrines for girls. On average, there was one latrine per 152 pupils; however, there were even schools with one latrine for 479 pupils! Also, according to the School Survey report 2007, published by the Directorate of Primary Education (DPE), 43 percent government primary schools (GPSs) and 65 percent registered non-government primary schools (RNGPSs) do not have separate latrines for boys and girls. The same report shows that there are only 385 schools, representing less than one percent of the total number of schools that have toilets accessible to the physically challenged children.

Key Principles and Desired Features

Based on over two decades of experience with WASH in Schools in Bangladesh, the following key principles and desired features have emerged:

To design and construct child-friendly, gender-sensitive, good quality and sustainable facilities in schools for sanitation, hand-washing, water supply, compound fencing and solid waste collection;

To develop adequate knowledge, attitudes and skills on hygiene through life-skills based hygiene education and child participation. Experience shows that construction of WASH facilities is not enough to improve health. Improving hygiene behavior can often be as effective as building toilets and is more effective than offering safe drinking water;[38]

To incorporate parents and the community as target groups because there are several important roles they can play;

To develop a planning process and management model that addresses national, local and school/community levels;

To create political ownership to allow for a demand-responsive approach, scaling up and effective long-term interventions; and

Joint efforts and partnerships with government and nongovernmental partners dealing with school health/hygiene or other efforts to build child-friendly schools. The DPHE and the DPE have signed a Memorandum of Understanding (MoU) for WASH in Schools in collaboration with UNICEF.

3.7.5 Action Points on Hygiene Promotion

The following recommendations are made for effective hygiene promotion:

Change the Approach. The knowledge level related to hygiene promotion has increased significantly over the last few decades. However, the present hygiene promotion approach focuses on providing people with information that they already know. New approaches need to be explored that are effective in translating people's knowledge into practice;

Integrate IEC Guideline for WASH Promotion. Combine the different approaches to hygiene promotion by different NGOs and development projects, and prepare an integrated IEC Guideline for the communities which will include hygiene promotion, WASH in Schools, proper O&M of water and sanitation facilities, and the Water Safety Plan;

Integrate Hygiene Promotion with Water and Sanitation Interventions. The best results of hygiene are achieved when it is integrated with water and sanitation interventions. Thus all development programs related to water or sanitation should be designed as a combined package of water, sanitation and hygiene promotion components;

Embed into National Strategies. Hygiene promotion should be incorporated in the proposed National Strategies for WSS; and

Coordinate with Sector and Inter-sector Partners. Effective coordination with sector partners like NGOs and private parties may be done through the National Forum at the national level and WATSAN Committees at the local levels. It is important to coordinate hygiene promotion works in the water and sanitation sector with the works of MoHFW, particularly for the supporting roles of the health assistants at the ward levels. Coordination is also required with MoPME, Ministry of Education and

[38] S. Esrey, *et al.,* 1990: *Health benefits from improvements in water supply and sanitation: survey and analysis of the literature on selected diseases.* WASH technical report no. 66.

Ministry of Environment. The proposed Secretaries' Committee on Water Supply and Sanitation could be instrumental for this purpose.

3.8 Vulnerable Groups

3.8.1 Introduction

The findings of various national and international studies show that there have been significant improvements in the overall quality of life of the vulnerable groups when they are provided with easy and timely access to safe WSS facilities. In broad terms, the vulnerable groups include the following categories of people (according to NSAPR-II)[39]:

- women;
- children;
- persons with disability/differently able people;
- indigenous communities;
- disadvantaged and extremely poor persons; and
- floating population.

In the context of Bangladesh, understanding the WSS needs of the vulnerable groups, and accordingly designing and implementing appropriate policies, strategies and plans, is of paramount importance given that, of the over 40 percent of the country's population that lives below the poverty line, the majority are members of the vulnerable groups and lack access to water and sanitation services. The vicious cycle of poverty and vulnerable groups is shown in Figure 3.5.

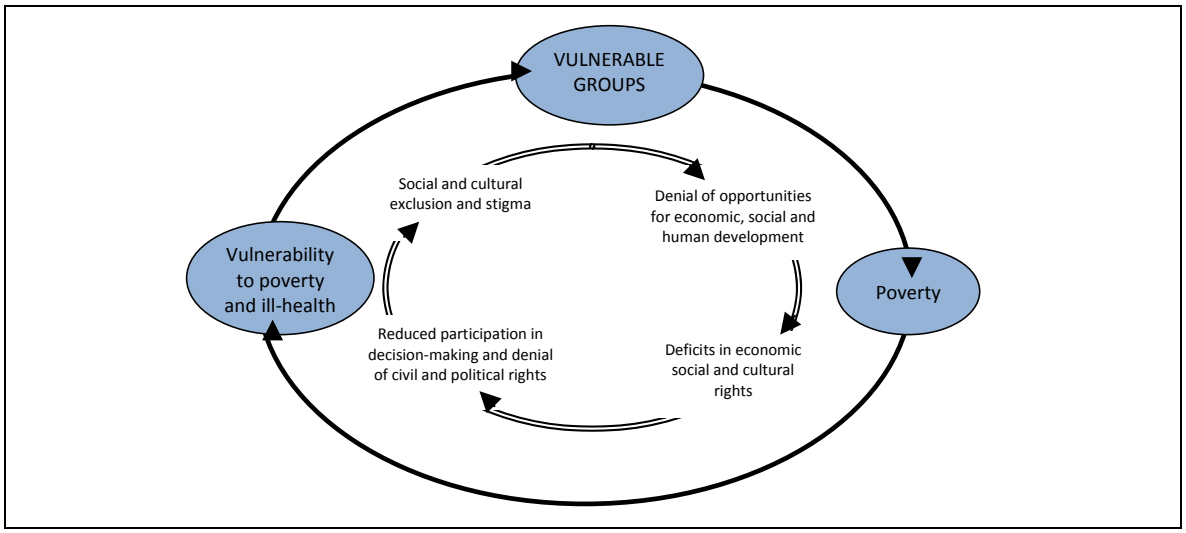


Figure 3.5: Poverty and vulnerable groups – a vicious cycle

Source: Water, Engineering and Development Center (WEDC), 2005.

[39] Vulnerable groups are discussed in the NSAPR-II under the chapter on "Ensuring Participation, Social Inclusion and Empowerment", which is one of the five supporting strategies aimed at accelerated poverty reduction and economic growth. In general, the NSAPR-II recognizes that such groups have different realities, obstacles and opportunities, and thus need to be empowered to establish their rights and gain equal access to resources and services.

This section first summarizes the national and WSS sector policies, strategies, plans and guidelines on addressing the needs of different vulnerable groups, presents major issues and finally identifies action points[40].

3.8.2 Women

Studies show that the likelihood of success of poverty reduction and development interventions in the WSS sector is generally high when both women and men are fully involved in demand-driven programs (The World Bank, 2007). Further, incorporating gender aspects into the WSS sector benefits not only women, who are often direct users, providers and managers of water and also guardians of household hygiene, but also men (see Box 3.8 for definition of terms on gender used in this section).

Box 3.8: Gender definitions

Gender refers to the specific roles and responsibilities of women and men in any society. It is related to how we are perceived and expected to think and act as women and men, because of the way society is organized, NOT because of our biological differences.

A gender-sensitive approach implies that attitudes, roles and responsibilities of women and men are taken into account, that it is recognized that both sexes do not necessarily have the same access to, or control over, resources, and that work, benefits and impacts may be different. It requires open-mindedness in consideration of:

- Differences in interests even within households;
- Conventions and hierarchies that favor one sex over the other;
- Differences based on age, wealth, ethnicity and other factors; and
- The way gender roles and relations change over time due to socioeconomic and technical developments.

Gender mainstreaming does not refer only to women. It is the process of assessing the distinct implications for women and men of any planned action, including legislation, policies or programs in all areas and at all levels. It is a strategy that takes into account women's and men's concerns and experiences to ensure that women and men (rich and poor) benefit equally and inequality is avoided.

Source: Deirdre Casella, June 2004: WELL FACTSHEET Gender and Poverty. Quality Assurance: Sandy Cairncross, Christine Sijbesma.

Gender and demand-responsive approaches also help increase women's human capital and the community's health, ensure greater safety and privacy for women and girls to relieve themselves, and shorten women's and girls' time spent collecting water, thereby freeing up their time for income-generating activities and school attendance, respectively. In sum, the productivity of society increases when gender issues are duly considered.

Gender Policies, Strategies and Project Guidelines: The government's 2009 Revised NSAPR II points out that women and men share many of the burdens of poverty, but women are affected differently

[40] Details on vulnerable groups-related issues are also discussed in Chapter 3 (Water Supply and Sanitation Sector Thematic Areas), Chapter 5 (Sector Capacity Building) and Annex 6 (Agreed Statements).

by development interventions. The NSAPR II states that the government's vision for women's advancement and rights is to "create a society where men and women will have equal opportunities and will enjoy all the fundamental rights on an equal basis". Further, the government's 2008 National Policy for Women's Advancement aims at, among others: (a) enhancing women's participation in mainstream economic activities; (b) incorporating women's needs and concerns in all sectoral plans and programs; and (c) ensuring gender sensitive growth with a regional balance.

The national position on gender is mirrored in the WSS sector policies and strategies. A major policy principle of NPSWSS is the central role of women in water management and hygiene education at the household level. In implementing rural and urban water supply and sanitation programs, NPSWSS further stresses that women "be encouraged and supported to actively participate in decision making during planning, operations and management" through their "increased representation in management committees/boards". NPSWSS also recommends adoption of a "gender sensitive approach" for planning of, investment in, and promotion of sanitation facilities.

In the government's Pro-Poor Strategy for the Water and Sanitation Sector in Bangladesh, 2005, one of the four eligibility criteria used to identify the hardcore poor households, which are eligible to receive government-subsidized water and sanitation services, is the households that are headed by females. NAMIP 2004 gives the supervision role of site selection of safe water source to the female member of the respective ward of the Union Parishad. Further, during site selection, it must be ensured that the water source is easily accessible by the women and the poor people.

At the project proposal screening stage, the 2009 National Vetting Guidelines for Water Supply and Sanitation Sub-sector require concerned agencies and the LGD to ensure that proposed projects are prepared in accordance with fifteen guiding principles. One of the principles is involvement of women in planning, implementing and operation and maintenance of services.

3.8.3 Children

While it is acknowledged that Bangladesh has made significant progress in the area of children's advancement and rights, there are more needs to be addressed since the survival and development of many children is still threatened by a host of factors such as poverty, illiteracy, malnutrition, abuse and diseases, including those due to a lack of access to safe water and environmental sanitation. It has been reported that the lack of access to safe water and environmental sanitation facilities causes one out of four deaths of under-five children by diarrhea, and that over 65 million episodes of diarrheal diseases occur annually among under-five children. Globally, due to a lack of access to water and sanitation facilities, 1.8 million people die every year from diarrheal diseases, including 90 percent of children under five, mostly in developing countries. Further, 1.3 million people are reported to die of malaria each year, 90 percent of whom are children under five.[41]

Children-related Policies and Strategies: At the national level, the PRSP II considers children's advancement and rights as one of the key elements of the supporting strategies to accelerate poverty reduction and ensure social inclusiveness. A major goal of the government towards children's advancement and rights is to provide "access to safe water and sanitation, and a healthy

[41] http://www.worldwatercouncil.org/index.php?id=23

environment," particularly in urban and remote settings. However, only the National Sanitation Strategy 2005 states that sanitation facilities must address the special needs and priorities of the children.

3.8.4 Differently Able People

Persons with different kinds of disability, such as the physically challenged, the visually impaired, the hearing impaired and the mentally challenged, are a part of every society and community. People with disability are among the poorest, the most marginalized and disadvantaged, lacking access to basic services, including the WSS, which contributes to their poor health and poverty (see Figure 3.5).

According to the UN estimates, there are more than 500 million people with disabilities in the world, of whom approximately 80 percent live in the low-income countries. While estimates vary from four to 10 percent of the population, a baseline survey in Bangladesh found about 14 percent was disabled (Water, Engineering and Development Center (WEDC) 2005 and PRSP II).

An inclusive approach to providing the WSS services brings a range of benefits to the people with disabilities and their families, including increased dignity and self-reliance; improved health and nutrition; and reduced poverty and improved well-being based on time released for t income generation and education-related activities (WEDC 2005). The UN Convention on the Rights of Persons with Disabilities thus emphasizes the importance of mainstreaming the disability issue as an integral part of relevant strategies of sustainable development.

Policies and Strategies related to the Persons with Disability: Overall, the PRSP II emphasizes that the government is strongly committed to the advancement and rights of persons with disabilities. In addition to the Constitution, which enshrines equal rights, Bangladesh is a signatory to the UN Convention on Rights of Persons with Disabilities and the Beijing Proclamation on the Full Participation and Equality with Disability in Asia and the Pacific Region. Further, Bangladesh has enacted the Bangladesh Disability Welfare Act (2001), the principal legislative instrument to provide protection for the persons with disabilities, and developed a National Disability Action Plan.

At the WSS sector level, there are no explicit references to addressing the needs of persons with disability. The Pro-Poor Strategy 2005, however, defines hardcore poor households as those that are, among others, headed by the disabled or women or old persons. The Pro-Poor Strategy's definition is endorsed by the National Sanitation Strategy 2005.

3.8.5 Indigenous Communities

Bangladesh has about 45 different indigenous communities located in a number of regions, with the majority living in the CHT and in the plain lands of greater Mymensingh, greater Rajshahi, greater Sylhet, Patuakhali and Barguna. Indigenous communities include Santal, Mushhor, Orao, Munda, Mahato, Bagdo Mahato minorities and river gypsies (locally called *Bedey*). There are an estimated 2.0 million indigenous people in Bangladesh, including 1.6 million plain land indigenous people. The CHT is described separately in Section 3.12. Globally, it has been estimated that there are 370 million indigenous people spread over 70 countries.[42] The indigenous people generally lack access to education, healthcare, food and nutrition, and the WSS facilities.

[42] http://www.indigenouspeople.net/sidemenu.html

Policies and Strategies related to the Indigenous People: In the PRSP II, the government's vision for indigenous communities is "to ensure their social, political and economic rights; ensure security and fundamental human rights; and preserve their cultural identity." The PRSP II also stresses that the indigenous communities will be ensured access to basic services and facilities, including the WSS. At the WSS sector level, there are no explicit references to addressing the needs of the indigenous communities.

3.8.6 Disadvantaged and Extremely Poor Persons

The PRSP II classifies the disadvantaged and extremely poor persons as those "who are subject to social injustice and are marginalized, and have little opportunities for overcoming their harsh realities." These groups include, among others, lower castes of the Hindu community, such as the sweepers, the fishers in the coastal areas, the teagarden workers, and the sex-workers. The Mohajirs (popularly known as non-Bengalee Bihari), Rohinga refugees (from Myanmar) and people living in the *chhitmahals* (enclaves) of Bangladesh in the Indian territory (covering an area of about 12,290 acres) may be considered the disadvantaged and extremely poor.

Policies and Strategies related to the Disadvantaged and Extremely Poor: At the national level, the government's vision for the disadvantaged and extremely poor groups is to include them into the mainstream of the society by ensuring their participation in socioeconomic activities, protecting their human rights, and reducing their poverty level. At the WSS sector level, the Pro-Poor Strategy 2005 and the National Sanitation Strategy 2005 make explicit references to the disadvantaged and extremely poor groups. However, in both documents, there is no definition of the disadvantaged and extremely poor groups in terms of profession and caste.

Box 3.9: Innovative community latrine model for vulnerable groups in slums

About one-third of the population in the cities of Bangladesh lives in slums. The habitation is extremely dense, for example, in Dhaka slums the population density is 2,20,000 persons per km^2, which is seven times higher than that of Dhaka city. Generally, a family in a slum lives in a very small single room house (size varies between 7- 10 sq m). The slum dwellers are mostly deprived of basic urban services including WSS. The latrines are mostly pit-type, which get filled up very quickly due to the large number of users and the absence of proper desludging and safe disposal. The excreta are disposed of in nearby open drains or water bodies causing serious health hazards. According to BBS-UNICEF Multiple Index Cluster Survey of 2009, only 12 percent of the slum dwellers are covered by improved sanitation facilities.

Several large NGOs like WaterAid, Dushtha Shasthya Kendra (DSK) and Plan International, in association with other partner NGOs, are providing community latrines in the slums as an attempt to address their needs. Innovative community latrines have been designed in consultation with slum dwellers to cater to the needs of all sections of people including vulnerable groups like women, children, elderly persons and differently able people. Community latrines are managed by a CBO with members from the neighborhood. CBOs also engage a caretaker and a cleaner. The users pay fees to the caretaker and the cleaner for O&M.

Community latrines are brick structure buildings with corrugated iron sheet roofing. Because of the very limited space in slums, the community latrine is constructed on top of the septic tank. There is a space of about half a meter between the roof and exterior walls so that there is enough light and air. Some portion of the roof has semi-transparent plastic corrugated sheets to allow additional light inside. Usually a tubewell or a water tap is present inside the building or very near it. There is bathing space inside the building.

A community latrine typically has four to eight chambers – each chamber is used by about 10 families. There are separate sections for men and women with separate entrances. The women's latrine chamber is relatively bigger to allow menstrual hygiene management. Similarly, the bathing space in the women's section is bigger to allow bathing of children. Railings are attached in entrance staircases and handles are attached to the inside walls of the latrine chamber for convenience and safety of pregnant women, elderly persons and people with disability. Hygiene promotion messages like hand washing after defecation are displayed on the walls.

An evaluation (Dev Con, 2007) of the community latrines revealed that the communities were mostly satisfied (78 percent) with regards to the distance of the community latrines from their houses. A majority of them (82 percent) was also satisfied with the indoor space. A high proportion (92 percent) was satisfied with ventilation arrangements. An encouraging finding was that women's privacy (90 percent) and social dignity of the family (91 percent) had increased tremendously by using community latrines. However, the satisfaction level was lower (55 percent) with regards to inside light arrangements. The community latrine model is being replicated by public agencies and NGOs.

Source: DevCon, 2007: Assessment of Functionality and Sustainability of Community Latrines under ASEH Urban Program.

3.8.7 Floating Population

Bangladesh is a highly and densely populated developing country. Most of the development activities are located in the urban areas. Poor people come for their livelihood and have no formal shelter to live. Many of them spend nights on railway stations, foot paths, and the open spaces like parks in urban areas apart from the slums. In addition, thousands of people come to town everyday for

business or other purposes and return home at the end of the day or at night. These people face problems of toilets and washing places. On the other hand, those living at night in different places also do not have formal water and sanitation facilities. In the absence of adequate sanitation facilities, this floating population makes a nuisance in different places like foot paths, streets, buses and railway stations.

3.8.8 Issues and Challenges of Vulnerable Groups

While the government is committed to assisting the vulnerable groups by providing greater access and offering more choices and opportunities, as reflected in various national and some WSS sector policies and strategies, the dimension and magnitude of the issue are such that much more needs to be done in a concerted, equitable and sustainable manner. The issues are highlighted in two groups, general and vulnerable:

General

- The issues related to the vulnerable groups are well narrated in national policies and strategies but need to be further emphasized in the WSS sector policies and strategies.
- Vulnerable group issues are multi-dimensional and multi-sectoral. However, there is an absence of a mechanism for effective monitoring and evaluation at all levels and lack of coordination among the related government ministries, agencies and the NGOs.
- There are a few good examples of the needs of vulnerable groups being addressed in water and sanitation interventions by the NGOs (Box 3.9) but these are not mainstreamed. Socioeconomic dimensions are not fully understood and considered.
- The lack of disaggregated data on vulnerable groups is a major constraint on formulating appropriate policies, strategies and action plans; and
- The absence of a mechanism for identifying the vulnerable groups and incorporating their needs in the water and sanitation interventions including the financing mechanism.

Vulnerable Group Specific

- ***Disability***: The Bangladesh Disability Welfare Act does not provide clear definitions of disability and is not based on a right-based approach.
- ***Children:*** Despite increase in sanitation coverage, 61 percent children do not have access to sanitary latrines.

3.8.9 Actions Points on Vulnerable Groups

The action points for the vulnerable groups are to:

- undertake a national-level survey to create a database on different vulnerable groups, focusing on their problems, needs, and priorities;
- undertake a learning approach to identify 'what works' and on this basis prepare guidelines, and design specific tools and approaches for the different vulnerable groups;

- create awareness and incorporate solutions to address vulnerable groups' issues in community-level planning;
- establish public toilets at the strategic locations with adequate management systems such as outsourcing O&M;
- incorporate the specific issues related to the vulnerable groups in the proposed Urban Water Supply and Sanitation Strategy and Rural Water Supply and Sanitation Strategy;
- enhance the capacities of the concerned agencies to more effectively address the needs of the vulnerable groups; and
- establish the focal persons for the vulnerable groups in the concerned WSS sector agencies for coordination and technical guidance.

3.9 Public-Private Sector Participation

3.9.1 Scope of Private Sector Participation

The benefits of private sector participation in the WSS sector include: (i) mobilizing private resource for the sector to meet growing investments needs; (ii) competition because of the entry of more investors; (iii) increased innovation and efficiency; (iv) lower prices; and (iv) universal coverage.

Generally, when applied in right environments, private sector participation can produce socially desirable outcomes. More specifically, a change in the structure of ownership (from government to private ownership) is not sufficient to make the private sector work; rather the presence of an enabling environment that harnesses competition is necessary for success. Conditions under which the private water suppliers can be more efficient include an innovative approach to competition, effective regulation, good governance and contract enforcement, and sufficiently effective demand. Ensuring that these necessary conditions prevail in the developing economy is a must before any private sector participation in the WSS sector is undertaken.[43]

In the development of the WSS sector in Bangladesh, both the public sector and the private sector are involved in a variety of ways.[44] Private sector participation can be categorized into three broad market segments, as explained below and shown schematically in Figure 3.6.

- **Small-scale Hardware Market:** In this open or highly competitive market, the sellers are mainly hardware shop entrepreneurs selling tubewell pipes and pumps, and latrine manufactures. While the products are sold directly to buyers in both rural and urban markets, it is predominantly a rural market. There is also no direct intermediary role of the public sector between the buyers and the sellers. Further, in terms of market share, this segment is the largest.

[43] ADB, 2008. EDB Working Paper No. 115, May 2008: Privatization revisited: lessons from private sector participation in water supply and sanitation in developing countries.

[44] Public sector participation is discussed in detail in Chapters 2 and 5.

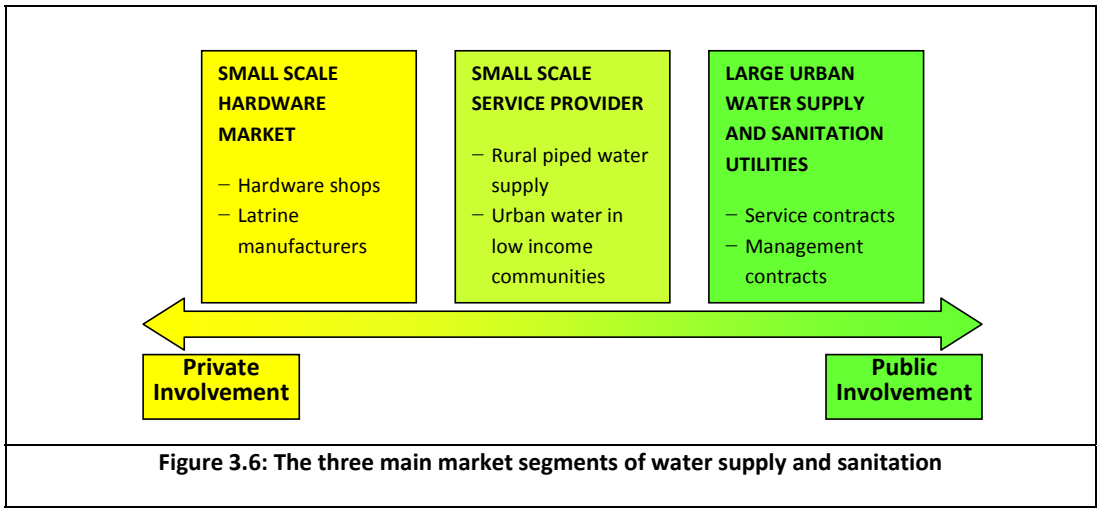


Figure 3.6: The three main market segments of water supply and sanitation

- **Small-scale Service Market:** These are small businesses like the operators of rural piped water supply and the NGOs operating water points in slums. These businesses usually obtain licenses or contracts from the public agencies to deliver the WSS services; and
- **Large-scale Urban Utilities Market:** This is the traditional type of private sector participation in public services. The operating functions of the utilities, and sometimes the investments and the associated risks, are shared between the private and public sectors. The public agency forms a partnership with the private operator through a contractual agreement, the type of which varies from simple service contracts and management contracts to leasing or concessions.

The issues and recommendations to develop the private sector in these three categories are described below.

3.9.2 Small-scale Hardware Market

The supply of rural WSS facilities in Bangladesh is dominated by the small-scale hardware market (about 80 percent of rural WSS) and this trend is expected to intensify and continue in the near future. Currently, the private sector installs around 300,000 handpump tubewells and one million latrines per year. The latrine manufacturers are involved in the upgrading of existing latrines (Box 3.10). Pipes and pumps for urban water supply are mostly manufactured in the country. The private sector has also demonstrated its potential to address the emerging challenges, such as production and installation of different types of handpump tubewells for low groundwater levels. It also supports hygiene promotion by producing low-cost soaps for hand-washing and sanitary napkins. The private manufacturers have the potential, in the near future, to produce arsenic test kits (a future demand of 10-20,000 kits per year) and water meters (about 50-60,000 meters per year). The small-scale hardware market is also able to provide after-sale services. The production of handpump tubewells and the repair of motorized pumps can be carried out in this market. In case of urban water supply, plumbers are available for day-to-day repair and maintenance works.

An emerging issue is that the rural WSS sector scenario is fast changing. With the rising income levels of the people and growing awareness for higher service facilities, there is an increased demand for technologies with higher levels of sophistication in contrast to the simple handpump tubewells and water-sealed pit latrines. To meet this demand, the technical and business skills of the private sector will need to be further enhanced.

Box 3.10: Moving up the sanitation ladder – private sector contribution

About a quarter of the latrines installed in rural areas do not have water-seals or they are broken. However, latrines without water-seals are the first step of the sanitation ladder. The next step in improvement, which is commonly termed as moving up to the next step in the sanitation ladder, is having water-seals (see Box 2.3).

Many latrine manufacturers in rural areas are trained by NGOs such as BRAC and WaterAid to fix water-seals in existing latrines. At the same time, the NGOs motivate the communities to fix the water-seal. Rural people are now aware of the benefits and there are many cases of their buying services for fixing water-seals in their existing latrines at a cost of BDT 30 to 50 per latrine, including material cost. Within the last two years, the BRAC Program (*BRAC WASH Program Review Report, May 2010)* alone has fixed 1.7 million water-seals covering a population of over 8 million.

Action Points

The action points to support this market segment are to:

- continue encouraging the private sector to play a major role in rural WSS to meet people's expectations;
- support the private sector to meet the challenges resulting from the changing scenario. Areas of support would be entrepreneur development and supply chain development, technical training on pump manufacturing and drilling techniques to meet the quality service standards of new types of tubewells. The private sector should also be provided with technical information on appropriateness of technologies for different conditions as well as information on required depths and possible yields of tubewells in the locality. These support activities could be provided through the DPHE;
- motivate the consumers to use higher quality of water and sanitation services through awareness and promotional activities, particularly through the introduction of an integrated IEC package for WASH. Such activities may be carried out by the LGIs in cooperation with the NGOs; and
- use social services and legal instruments of the LGIs to monitor and ensure the quality of WSS services delivered at the household levels (for example, sanitary protection of tubewells and latrines with water-seals). As a very competitive market exists with a large number of producers in the rural WSS sector, there is no immediate need for economic (price) regulation.

3.9.3 Small-scale Service Market

This market segment is partially developed and presently caters to only a small portion of WSS services (<1 percent), but is expected to grow substantially in the future. The degree of intervention of the government in this segment of the market is relatively low. Several rural piped-water supply models (different projects implemented by the DPHE, Barind Multipurpose Development Authority (BMDA), Rural Development Academy (RDA) and Social Development Fund) with varying degrees of involvement of the private sector, communities and the LGIs are being tried out in this market. The results are mixed but there is a growing demand. Sludge emptying from septic tanks and disposal are also done by small-scale service providers. Although there is a good example of using suction machines (Vacu-Tug) by some NGOs to empty septic tanks in the urban areas, much improvement is needed for handling sludge in a safe and environment-friendly way. There have also been successful cases of operation of water points in urban slums by the NGOs or the CBOs, which buy water from the public utilities and on-sell them to the users (Box 3.11).

In the future, the small-scale providers may be engaged in operating piped sub-networks, serving an area outside the service area of the utility. They may also be contracted to operate and maintain simple, decentralized wastewater treatment plants.

The small-scale service providers need capacity support for further development. There is also a need to introduce regulations for quality assurance and environmental protection.

Box 3.11: Bangladesh: Improving rights to services for slum dwellers in Dhaka

Approximately 25 percent of Bangladesh's population lives in urban areas. Until very recently, most cities did not permit households without legal entitlement to land to access water supplies. In Dhaka, where 35 percent of the city's 14.8 million population lives in slums and squatter settlements, this meant that residents unable to demonstrate ownership of the land on which they resided, were not entitled to services by the Dhaka Water Supply and Sewerage Authority (DWASA).

In 1992, Dhaka-based NGO DSK, a partner of WaterAid in Bangladesh, started to act as an intermediary between DWASA and the slum communities. DSK argued for the separation of access to water supply from ownership of land. It made security deposits to guarantee bill payments by the communities. As a result of this arrangement, DWASA approved two water points in poor areas of Dhaka in 1992 and 1994.

DSK subsequently developed this experience into a model for sustainable water supply for the urban poor, and negotiated with DWASA to carry out a pilot project of this model in 12 slum communities. DSK worked with the communities to improve community capacity to manage water points, ensuring regular bill payments and full recovery of capital costs. In 2008, after 16 years of regular payments of bills, a landmark agreement was secured with DWASA whereby CBOs were allowed to apply for water connections on their own behalf, without an intermediary.

Today, these communities are respected customers of DWASA and the scheme is being rolled out across the country. Those previously excluded are now actively involved in the design and usage of water points and repayment schemes.

Source: WaterAid Report, March 2010: Raising visibility and voices of the urban poor civil society's engagement in urban water and sanitation reform – experiences from WaterAid country programs.

Action Points

The action points to develop this small-scale provider segment are to:

- continue exploring all the different rural piped-water supply models with the objective to scale up appropriate models;
- develop regulations for service quality and environmental protection with the involvement of the LGIs. This would include providing licenses, for example, for plumbing, desludging, and arsenic and other water quality testing;
- provide technical and management support to strengthen the existing businesses and develop new businesses. This could be done by the DPHE;
- encourage their involvement in water supply and hygiene promotion, such as supplying leaflets on the Water Safety Plan when selling a handpump or hygiene promotion leaflets when selling a latrine unit;
- train private mechanics, motivators and water quality testers. This can be done by the DPHE; and
- post the national programs on the websites so that the small-scale service market can estimate the demand and prepare themselves accordingly.

3.9.4 Large-scale Urban Utilities Market

At present, there is no major large-scale private sector participation in the management of WSS services in the urban areas. In Dhaka, billing and collection contracts awarded by DWASA to private firms for some areas have met with varied success. DWASA is also exploring the potential viability of management contracts for O&M of District Metered Areas (DMAs). In 2005, Faridpur municipality signed a three-year service contract with a local private operator for billing and collection. Although the revenue collection improved, the contract was not extended by the municipality for a variety of reasons.

The private sector participation models of urban utilities range from simple service contracts and management contracts to advanced types, such as Build Operate Transfer (BOT) and concessions. The NPSWSS 1998 encourages the promotion of private sector participation in urban water supply by Build Operate Own (BOO)/BOT schemes. The PPP (with Foreign Direct Investment or FDI) is regulated by the Bangladesh Private Sector Infrastructure Guidelines (BPSIG) 2004 where water and sanitation is one of the eligible sectors. The Private Infrastructure Committee (PICOM) does the listing, the processing and the monitoring of the PPP projects. The government has attached high priority to PPP development and, in June 2009, the Finance Division published a Position Paper entitled "Invigorating Investment Initiative through Public-Private Partnership." Again the water and sanitation sector is highlighted in the paper as a priority.

Studies have shown that there is a good potential for the PPP in the WSS sector in Bangladesh.[45] However, the country investment environment is not very conducive to the advanced types of the PPP. The prospect of the FDI is low unless investors are supported by the solid guarantees and financial support from international financers. Initially, the PPPs should be based on local private

[45] Royal Netherlands Embassy, Dhaka, April 2006: Inventory of Possibilities of Involving the Private Sector in Water Supply and Sanitation Services in Bangladesh.

sector models (Local PPP Models). With the gradual building up of PPP experiences, higher forms of PPP, including attracting private capital, would be possible. It is also suggested that any PPP development be implemented as a Tripartite Partnership (TPP) (Box 3. 12).

One of the preconditions of the PPP is that the utilities should be well developed and should have full autonomy for decision making. However, in the case of paurashavas, the water utilities section is within the administrative control of the paurashava, which in itself lacks adequate autonomy. In most cases, the Paurashava Water Supply Section (PWSS) accounts are not separately maintained and the paurashavas cannot recruit new staff without the approval of the ministry. Therefore, it is necessary to develop a clear path toward increased private sector involvement, including investments through the PPP arrangements. In the process, while there will be an increasing role for the private sector, a lot of preparatory work remains to be done at the public sector level.

Box 3.12: Tripartite Partnerships *for better balanced and sustainable solutions*

Action Points

The recommendations to develop the urban utility market segment are to:

- incorporate the concept of the TPP while developing PPP models. It will ensure strong embedding of the social virtues and the voice of the poor will be represented;
- follow a transition path to the PPP by preparing the WSS sector and the utilities (Box 3.13). The underlying principle is to start first with simple types such as service contracts and management contracts;
- prepare a guideline for the PPP for the WSS sector as mentioned in the NPSWSS. This guideline should clearly spell out the encouraging intentions of the government. The guideline could be prepared after having some experiences in the PPP; and
- appoint a facilitating agency (for example, Infrastructure Investment Facilitation Center (IIFC) or consultants) to gradually introduce the PPP, and establish a public counterpart which can coordinate and support policy decisions (for example, PSU).

Box 3.13: Transition path for PPP in Bangladesh

Prepare the WSS sector:

- Make WSS utilities more autonomous;
- Recruit required staff;
- Rationalize the water tariff structure;
- Create public awareness; and
- Create an independent regulatory body

Prepare the Utilities:

- Implement a sound administrative and accounting system ;
- Improve billing and collection systems;
- Introduce metering wherever possible;
- Develop an improved register of assets;
- Implement the MIS; and
- Rationalize staff composition, in terms of number and skill mix.

Taken from Inventory of Possibilities of Involving the Private Sector in Water Supply and Sanitation Services in Bangladesh by the Royal Netherlands Embassy, Dhaka, April 2006.

3.10 Environment, Climate Change and Disaster Management

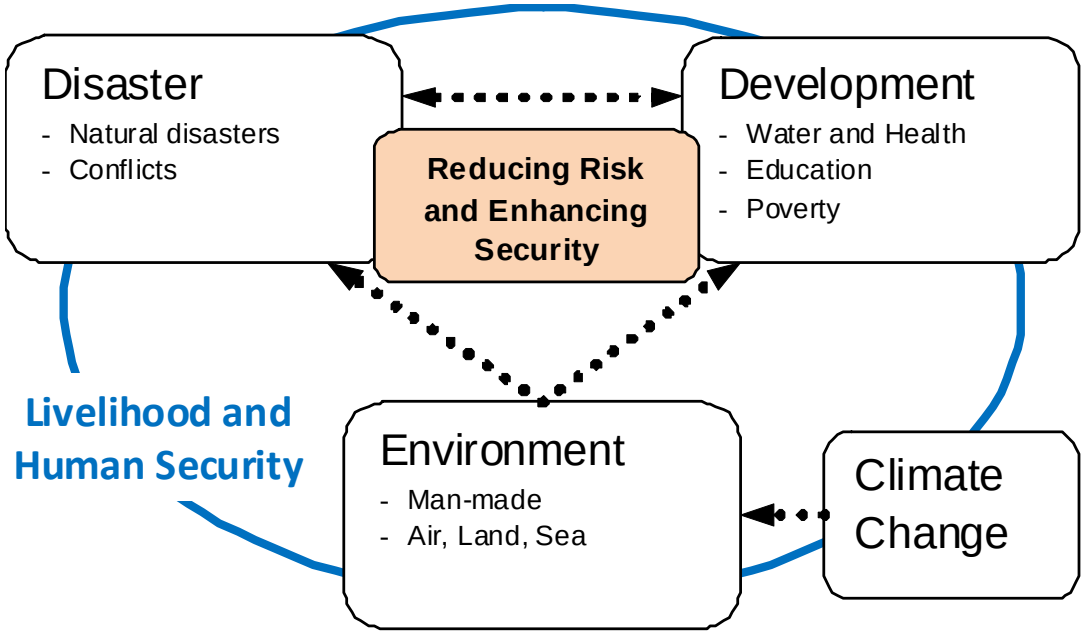
3.10.1 Linkages between Environment, Development, Disaster, Climate Change and Livelihood

The physical environment, comprising land, water and air, changes over time through development, disasters, climate change and environmental degradation. Development comprises natural and man-made changes, including physical development with buildings and infrastructure and human welfare development comprising health, education and poverty reduction. Disasters comprise the large-scale effects of extreme physical events such as earthquakes, floods, droughts and tropical cyclones. Climate change comprises natural and man-made global warming affecting the frequency and magnitude of extreme climate-related disasters, such as floods, droughts and tropical cyclones. Livelihoods of people are affected either positively or negatively by the environment, development, disasters and climate change depending on the measures adopted.

When we look at these development and environmental issues, including climate change, from the perspective of disasters, we see a strong interdependency – each influencing and being influenced by the others. At the center of these interactions is the objective of "reducing risk and enhancing security" (Box 3.14). This objective, in fact, forms the core of the overall umbrella of human security.

Human security is related to people's freedom. The UN Millennium Summit of 2000 at first described human security as a development concept related to 'the degree of freedom' enjoyed by people.

Box 3. 14: Linkages between disaster, development, environment and climate change



Source: Rajib Shaw, Kyoto University: Adapted from Environment and Disaster Management a presentation, www.info.worldbank.org/etools/docs/library/230308/Session

In the National Plan for Disaster Management (NPDM) 2010-25 (final draft March 2010), the GoB recognizes the need for a clear policy and strategy for the attainment of sustainable development, linked with environmental management and effective disaster reduction. The incorporation of climate change issues is also emphasized in the NPDM.

3.10.2 Environment

Introduction

The environment includes land, water, air and physical properties and the inter-relationship which exist among and between them and human beings, other living beings, other creatures, plants and micro-organisms (Section 2(d) of Bangladesh Environmental Conservation Act 1995). The four broad areas of environment which are mostly addressed in the context of Bangladesh are physical environment, biological environment, economic environment, and social-cultural environment (Box 3.15)

Box 3.15: Broad areas of environment

Physical Environment	Biological Environment
▪ Topography and soil ▪ Atmosphere (air quality and climate) ▪ Geology and seismology ▪ Water resources (including water supply and sanitation)	▪ Fisheries and wild life ▪ Vegetation and forest ▪ Rare and endangered species ▪ Protected areas ▪ Water resources (including water supply and sanitation)
Economic Environment	**Social and Cultural Resources**
▪ Occupational structure ▪ Land use ▪ Industry and agriculture ▪ Infrastructure ▪ Transportation	▪ Demography ▪ Scio-economic conditions ▪ Health and education facilities ▪ History, culture and tourism

Environmental Concerns related to Water and Sanitation

Water is one of the important components of environment. It makes significant contributions to human life, but water sources, such as rivers, lakes and ponds, are becoming polluted due to unplanned human activities.

The two major components of water sources are: (i) surface water, and (ii) groundwater, which are inter-linked through hydrological cycle (see Box 3.1). Surface water is polluted by: i) interaction of urban, agricultural and industrial systems with their immediate environment; and, ii) release of treated or untreated effluents, fertilizers and other agricultural chemicals. Although these systems do not directly interact with groundwater in terms of pollution in Bangladesh, surface water seeps underground and eventually pollutes the groundwater. Groundwater can also be polluted by natural causes, such as arsenic in Bangladesh. The groundwater quality is discussed in Section 3.3 and this section concentrates on surface water pollution which is of the utmost concern for the environment.

The extreme pollution of the water resources is an urgent issue for Bangladesh. Sanitation, when not managed properly, also pollutes water resources and affects the water quality and health of people.

The Bangladesh Country Environment Analysis by the World Bank in 2006 identified five priority issues for Bangladesh: i) environmental health (including impact of water and sanitation and air

pollution); ii) surface water quality in Dhaka; iii) capture fisheries; iv) soil quality; and v) institutions for environmental management. Together, the environmental impacts on these issues account for economic losses equivalent to 4.2 percent of the GDP, out of which 37 percent occurs due to water, sanitation and hygiene, 23 percent due to urban air quality, 21 percent due to indoor air pollution, 17.5 percent due to Dhaka's surface water quality, and 2.5 percent due to fish culture.

Surface Water Pollution

Surface water pollution refers to the pollution of flowing waters (rivers, canals, etc.), and open water (nonflowing) reservoirs (ponds, *haors, baors*, and so on). River and canal water is mainly polluted by the disposal of untreated wastes into the river systems from industries and cities whereas the ponds, *haors* and *baors* are polluted by the excessive use of pesticides, and soil erosion.

Water pollution is severe in and around the large cities. The problems of surface water pollution including those related to the WSS in Dhaka, Chittagong and Khulna cities are shown in Box 3.16. Water pollution of surface water affects the health of poor people who cannot afford to choose between contaminated and noncontaminated sources. Waterborne diseases are the major cause of the sufferings for the poor people living in rural and urban areas. This is combined with the problem of water supply for bathing in both rural and urban areas (especially for the poor families) as a major health problem for Bangladesh.

Due to the rapid growth in urbanization and industrialization, water pollution is feared to be much higher. The interlinkage of pressure on the environment, state of pollution and impacts on life and natural environment are schematically shown in Box 3.17.

One of the major contributors to surface water pollution is fecal matter. The main problem in respect of water quality is the inadequate facilities for urban wastewater treatment. There is one sewage treatment plant in the entire country, serving only a part of Dhaka. Other areas use septic tanks and pit latrines. Pit latrines, which are widely used in the rural areas, are generally flooded during the rainy season and cause fecal pollution to adjacent land and water bodies on a large scale.

Box 3.16: Surface water pollution in three major cities of Bangladesh – Dhaka, Chittagong and Khulna

Surface water in **Dhaka** city and its surroundings is in a very poor condition, especially in the dry season. Comparing water quality indicators that are usable for fisheries and as a source of drinking water supply after conventional treatment (BOD 6 mg/l), and for pisciculture (ammonia 1.2 mg/l), it is found that, in the dry season, over 95 percent of the rivers surrounding Dhaka exceed the water quality level to an extent of 200 percent to 500 percent (Country Environmental Analysis, the World Bank, September 2006). These water quality issues reflect the large number of industries, especially tanneries, discharging untreated waste into the rivers. These river systems are virtually biologically dead with no fish or other such aquatic life or plants.

Of particular concern in the dry season is the high ammonia level in the raw water used by the Saidabad Water Treatment Plant, which now threatens the plant's ability to treat the water to drinking quality standards. The presence of excess amount of concentration of heavy metals including aluminum, lead, cadmium, mercury and chrome confirms the chemical contamination and adds to the complexities in water treatment (UNEP, Dhaka City, 2005: State of Environment).

Chittagong city is situated by the river Karnafuli, where the country's major port is located. Industrial, municipal and medical wastes, and the residues of agro-chemicals are discharged in huge quantities into the river. For example, the tanneries located at Battali Bazaar on Hathazari Road, the noxious industrial zone at Kalurghat, and the hide and skin business zone of Aturar Depot discharge about 150,000 liters of liquid effluents every day, contents of which also include chromium compounds. Karnafuli Paper Mills located upstream discharges 0.35 tons of china clay and other chemicals every day (ADB, May 2004: Chittagong Port Trade Facilitation Project, Volume 2).

River pollution has caused a decrease in the dissolved oxygen to a level that is inadequate for the survival of aquatic resources, including fish. Oil spilled from ships and boats also causes pollution. Scientists say that the thin layer of oil on the water prevents light penetration and exchange of oxygen and carbon dioxide across the air water interface. This prevents photosynthesis and also causes depletion of dissolved oxygen. The Community Development Center (CDC), an NGO working with fishermen, indicates that many of the 20,000 fishermen in Rauzan, Rangunia and Anwara thanas, who were previously dependent on the Karnafuli river, have given up their fishing profession because they do not have enough catch.

Khulna city is located by the rivers Bhairab and Rupsha. The major polluting industries in and near the city are Khulna Newprint Mills and other industries like jute, textile and fish processing. These industries are discharging about 10 million gallons of liquid waste daily into the rivers. Khulna Newsprint Mills alone discharges 4.6 million gallon (Khulna City, August 1999: tEnvironmental Maps and Work Book).

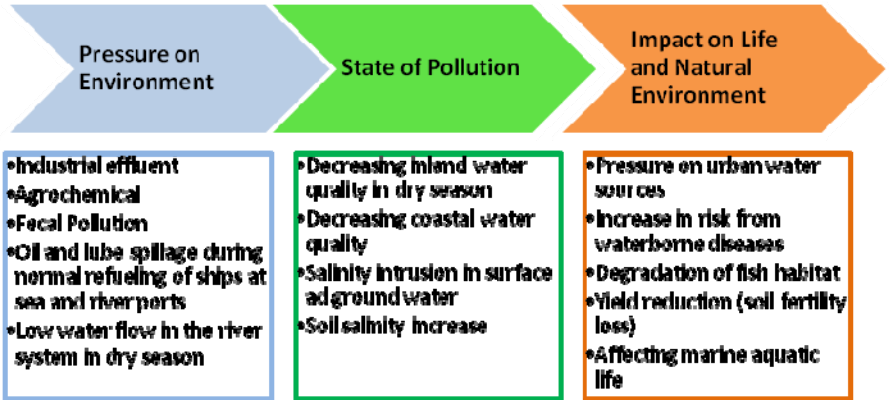
The stretch of the Bhairab river flowing along Khulna city is reported to have been devoid of any fish species in the past two decades, most likely due to pollution by industrial wastes. These pollutants are causing serious damage to both fresh water and marine ecosystems of the region, including those of the Sundarbans.

Legal Framework

Bangladesh Environment Conservation Act of 1995 provides the basis for environmental management. It requires that all industrial units or projects should obtain an Environment Clearance Certificate from DOE prior to implementation. Under the Act, Environment Conservation Rules were

formulated in 1997 which spell out procedures and documentation requirements for obtaining the Clearance Certificate for different projects. Schedule 3 of the Rule, which is related to water and sanitation, specifies the standards for ambient water quality and drinking water quality. Schedule 10 describes the standards for effluent from industrial units and projects.

Box 3.17: Inter-relation between pressure on environment, state of pollution and impact on life and natural environment



The Environmental Conservation Rules, 1997, does not suggest any specific measures for regulation of wastes, treatment of wastes, sludge management and sewage treatment plants. The following amendments are suggested:

Surface Water:

- More detailed surface water quality standards, including more parameters, in Schedule 3 in view of the chemical pollution in the urban watershed; and
- Revision of drinking water quality standards (discussed in Section 3.4).

Water Pollution:

- Revision of point source discharge standards (Schedule 9 and 10) including more parameters in view of the changing characteristics of water pollution in the urban watershed.

Sewage Discharge Management:

- Inclusion of sewage treatment plants in the Industrial Emission Standards (that is, in Schedule-11).

Institutions in Environmental Management

The primary institution for environmental management is the DOE under the MoEF. The DOE has the authority and mandate to regulate and enforce environmental management, including the pollution control of water resources. The works of the DOE is expected to be supported by different sectoral policies and legislation, such as land use, water and toxic chemicals, environmental health and

sanitation. The DOE's regulation of local government institutions that ensures the compliance of service providers against environmental standards can reduce complexity. It is also important that there is provision for a public information system to raise awareness of the causes and the impacts of pollution, and also to build support for the necessary investments and regulatory enforcement.

Major agencies with activities in the water sector, such as the BWDB, the LGED and WASAs, have environmental guidelines for developing and implementing their projects. The LGED has established an environmental cell. However, there is a lack of skilled staff in these agencies. The DPHE is yet to have a dedicated environmental unit. Training of the relevant staff of sector agencies on environmental awareness and empowerment to take action would contribute greatly to raise environmental standards.

3.10.3 Climate Change

Introduction

Globally, it is now indisputable that the climate is changing. Climate change makes the development challenges more complicated and severely affects the developing countries in particular. The impacts are already being felt globally, with more droughts, more floods, more high intensity storms and more heat waves – taxing the individuals and the governments and drawing resources away from development. By the end of this century, climate change could lead to an increase of five degree centigrade (^{0}C) or more compared to preindustrial times and make a very different world from what it is today. Despite our best efforts, there could be an increase of 2^{0}C that would cause more frequent and extreme weather events, including heat waves, increased water stress in many regions, declining food production, damaged ecosystems and so on. These likely impacts give a clear warning that substantial adaptation will be required.

> ***"Warning of climate system is unequivocal."***
>
> – Fourth Assessment Report of the Inter-Governmental Panel on Climate Change (IPCC), 2007.

The Fourth Assessment Report of the Inter-Governmental Panel on Climate Change (IPCC) in 2007 has described climate change impacts for different regions of the globe with very high accuracy and high confidence. The report identifies Bangladesh as one of the worst victims of climate change. Climate change could affect more than 70 million people due to Bangladesh's geographic location, low elevation, high population density, poor infrastructure, high levels of poverty and high dependency on natural resources.[46] In severe climate change scenarios, rising sea levels would submerge 18 percent of country's land (and the whole of the Maldives).[47] The Organization for Economic Cooperation and Development (OCED) and the World Bank have estimated that 40 percent of the overseas development assistance to Bangladesh may be climate-sensitive or at risk.

[46] UN Human Development Report 2007/08.

[47] The World Bank, 2010. World Development Report 2010.

Bangladesh had ratified the Climate Convention in 1994 and the Kyoto Protocol in 2001, and is taking a strong position to face the climate change related challenges. Regionally, it has championed climate change concerns in development which has led to the South Asian Association for Regional Cooperation (SAARC) declaration on climate change in December 2007. In order to create a coordinated national framework and describe the government's strategy to combat the affects of climate change, the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) was launched in September 2008. The BCCSAP was updated in 2009. It builds on the National Program of Adaptation (NAPA), published in 2005. The climate change issues are strongly reflected in NSAPR *2009-11*. The government has established a Climate Change Trust Fund (BDT 700 crore, equivalent to US$100 million) to finance climate change-related mitigation projects by government agencies, the NGOs and the private sector.

The government had also established the Climate Change Cell in 2004 under MoEF to enable the management of long-term climate risks and uncertainties as an integral part of national development planning. A total of 61 focal points have been established in different ministries, including the LGD, technical agencies, academic institutions and research institutions to create awareness, build capacities and mainstream climate change into the development process.

Effects on Water Supply and Sanitation

It is likely that the gradual change phenomena, such as temperature rise, increasing sea levels and more unpredictable weather patterns will affect the WSS sector having economic, environmental and health impacts (Figure 3.7).

Climate change related extreme events, particularly cyclones and storm surges, will damage WSS infrastructure in the country, especially in the coastal regions (Box 3.18).

Box 3.18: Climate change would increase saline intrusion through several means

- Directly pushing the saline/fresh waterfront in the rivers through higher sea levels;
- Lower river flows from upstream, increasing the pushing effect from the sea;
- Upward pressure on the saline/fresh water interface in the groundwater aquifers (every centimeter of sea level rise will result in a 40-fold rise of the interface because of the hydrostatic pressure balance);
- Percolation from the increased saline surface waters into the groundwater systems;
- Increasing evaporation rate in winter, leading to enhanced capillary action; and
- Subsequent salinization of coastal soils.

The rise in summer temperature will increase water demand in the urban area for drinking and bathing as well as demand for industrial water for cooling systems. Competitive demand may aggravate the current conflict between domestic and industrial water supplies in the urban areas. The situation will be different in the rural areas where the availability and the quality of water from rivers, artesian wells and ponds in the dry season will deteriorate. Due to the rise in temperature, evaporation rates will be higher in the agricultural fields and plants, which eventaully will increase the demand for irrigation water on the one hand, and cause decline in the groundwater levels on the other.

Shortages of safe drinking water are likely to become more pronounced, especially in the coastal belt and drought-prone areas in the north-west of the country. It is also likely that the saline water boundary will be pushed further inland and vast areas will face severe water crisis in the future. People now having access to fresh water will no longer enjoy this service. Due to cyclones and storm surges, huge volumes of saline water will come onto the land area and contaminate freshwater ponds. These will severely damage the existing drinking water sources. For instance, ponds and dug wells may be flooded with saline water. It may also contaminate handpump tubewells and other sources.

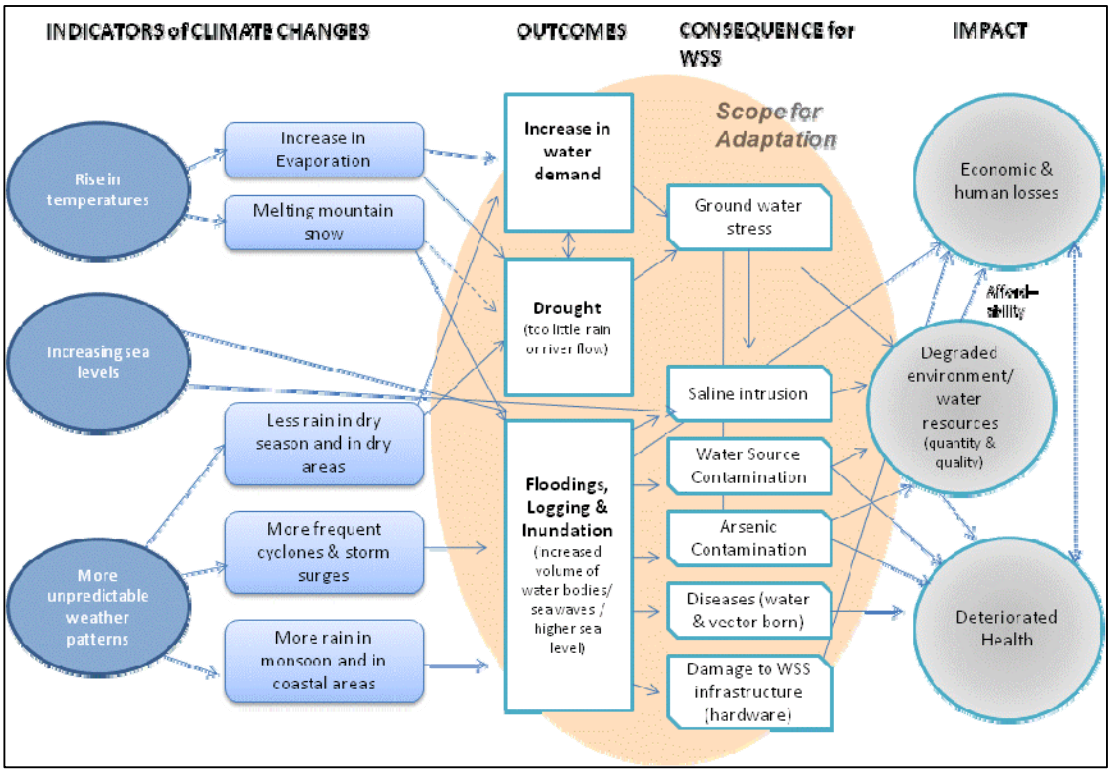


Figure 3.7: The cause-effect diagram of climate change: Indicators and consequences for water and sanitation and impact on human life

Source: PSU, July 2009: Climate Change Management Plan for the Water Supply and Sanitation Sector in Bangladesh.

It is likely that unavailability and low quality will accentuate the prevailing drinking water crisis in the dry season. This crisis will impose hardships on women and children who are 'responsible' for collecting drinking water for their families. Increasingly, saline drinking water may also cause health hazards, especially for pregnant women, and it appears that climate change is likely to adversely affect women more than men.

Issues and Challenges

A Climate Management Plan for the WSS sector in Bangladesh was prepared by the PSU with assistance from DANIDA in June 2009. This task made a comprehensive assessment of the policies and strategies, and developed methodology (for example, risk identification diagram) and tools (for

example, screening and risk assessment matrix) for the systematic screening of the sector for the effects of climate change. It also analyzed the actions taken by different projects as well as the actions to be required in the future.

The following issues and recommendations made here are heavily drawn from the Climate Management Plan:

- Climate change is addressed in a very limited way presently. Examples include raising the level of tubewells and latrine platforms to protect against flooding;
- With the exception of the Vetting Guideline for the WSS projects (PSU, 2010), climate change is not mentioned or included in any of the WSS related national policies, strategies or guidelines. This may not be at all surprising as most of the documents were developed more than a decade ago when knowledge and awareness on WSS-related climate change issues were relatively inadequate. Moreover, climate change issues were then not sufficiently incorporated in the national programs as well;
- As water sources, both surface and ground water, are at risk due to climate change, there is an urgent need for water regulation and enforcement of such regulations. Only if water sources suitable for safe drinking water are protected and if the control mechanisms are enforced, the concerned agencies will be able to provide safe drinking water in the future;
- Many adaptation and disaster risk reduction activities are being carried out but in an isolated way. There is a need for a central institution which can gather information and data, and share experiences and best practises in the sector. Although the Climate Change Cell is supposed to initiate and coordinate such functions, its role is limited to the water and sanitation sector-specific issues; and
- There is little scientific research available on the more technical or spatial issues of the vulnerability of WSS installations, that is, the degree to which the installations being promoted at present are actually suitable or sustainable. Also, there is a need to test new or improved technologies that may be more resilient to climate change.

3.10.4 Disaster Management

The geographical location, land characteristics, multiplicity of rivers and the monsoon climate render Bangladesh highly vulnerable to natural disasters. The coastal morphology of Bangladesh influences the impact of natural hazards on the area. Especially in the south western area, natural hazards increase the vulnerability of the coastal dwellers and slow down the process of social and economic development. Natural and human induced hazards --- floods, cyclones, droughts, tidal surges, tornadoes, earthquakes, river erosion, fire, infrastructure collapse, high arsenic levels of groundwater, water logging, water and soil salinity, epidemic, and various forms of pollution--- are frequent occurrences.

Definition of Disaster
An event, natural or man-made, sudden or progressive, that seriously disrupts the functioning of a society, causing human, material, or environmental losses of such severity that the affected community has to respond by taking exceptional measures. The disruption (including essential services and means of livelihood) is on a scale that exceeds the ability of the affected society to cope with using only its own resources.

The NPDM 2010 emphasizes broad-based strategies as follows:

- Disaster management would involve the management of both risks and consequences of disasters that would include prevention, emergency response and post-disaster recovery;
- Community involvement in preparedness programs for protecting lives and properties would be a major focus. Involvement of local government bodies would be an essential part of the strategy. Self-reliance should be the key to preparedness, response and recovery; and
- Nonstructural mitigation measures, such as community disaster preparedness, training, advocacy and public awareness, must be given a high priority; this would require integration of structural mitigation with nonstructural mitigation measures.

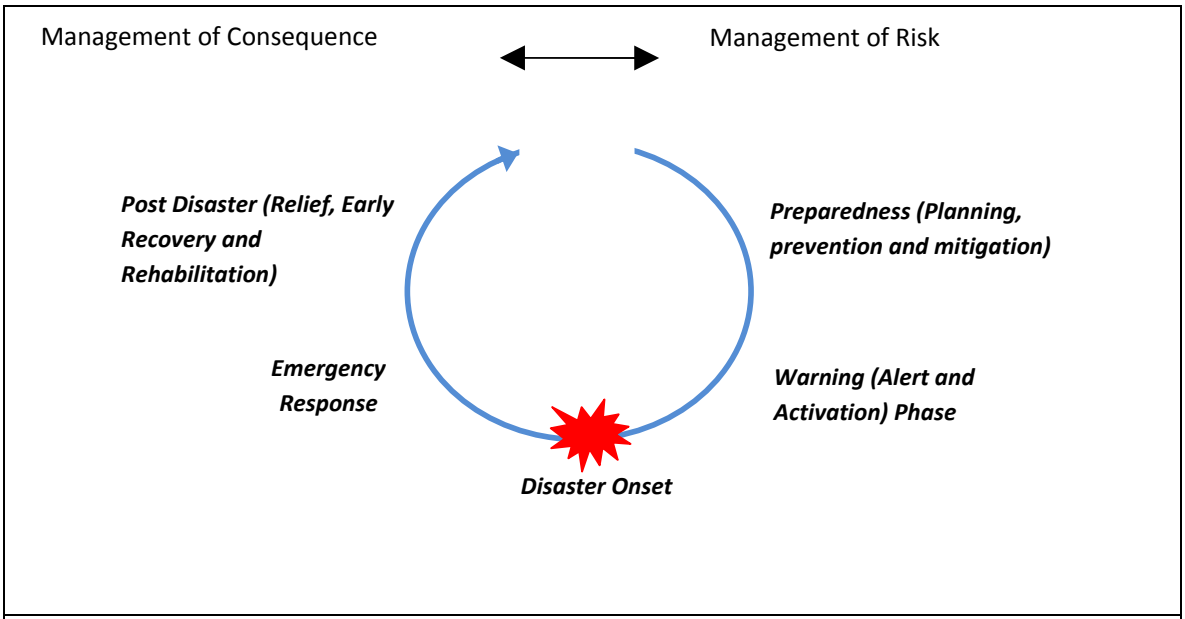


Figure 3.8: Disaster management cycle

Figure 3.8 shows the disaster management cycle which consists of a continuous chain of activities including preparedness, warning, emergency response and post-disaster recovery. Learning from disasters provides inputs to increase the effectiveness of disaster preparedness.

National Disaster Management Structure

The 2010 Standing Orders on Disaster (SOD) by the Ministry of Food and Disaster Management (MoFDM) forms the legal basis of national disaster management where a series of interrelated institutions have been created at both national and sub-national levels to ensure effective planning and coordination of disaster management. Roles and responsibilities are allocated to different government agencies and committees. The MoFDM is the national focal point for disaster management in Bangladesh. It manages disasters through its three agencies: Disaster Management Bureau (DMB), Directorate of Relief and Rehabilitation (DRR), and Directorate General of Food. It is assisted by various government ministries and agencies including the LGD, the DPHE and WASAs.

At the national level, the important committees are National Disaster Management Council (NDMC) headed by the Prime Minister to formulate and review the disaster management policies and issue directives to all concerned; and Inter-Ministerial Disaster Management Coordination Committee (IMDMCC) headed by the minister in charge of the MoFDM to implement the disaster management policies and decisions of the NDMC and the government. The SOD has been revised and a Draft Disaster Management Plan has been prepared. The enactment of a disaster management law is currently in progress.

At the sub-national levels, disaster management committees (DMCs) have been established at different local government tiers – district, upazila, union, city corporation and paurashava. These committees are headed by the respective administrative chiefs.

Issues and Challenges of Disaster Management in Water and Sanitation

Every year floods inundate vast parts of the country with varying intensity. Floodwater submerges and contaminates the tubewells and other water sources, and latrines are often washed away. Hygiene practice is constrained due to the absence of safe water, latrines and places for waste disposal. Cyclones and storm surges cause similar destruction of water and sanitation installations. The recent cyclones, Sidr and Aila, are examples of extensive damage caused by natural disasters. The women and children suffer most because of their vulnerability and need for privacy.

After a disaster, the DPHE, in collaboration with the LGIs, initiates emergency measures like installing tubewells and mobile water treatment plants, and sanitation facilities. Water bottles and disinfection tablets are also distributed. The levels of the handpumps of the tubewells are raised by fixing a piece of pipe to prevent the pump from being submerged. Different awareness and training programs are carried out by the DPHE, the NGOs and other government agencies, but the coverage is limited. In the urban areas, WASAs, city corporations and paurashavas undertake measures to protect the water supply installations and provide water by tankers. Severe floods sometime cause erosion of road sides and expose the pipelines and the support structures. This causes breaking of pipelines. Even the pump houses are inundated, and the operation of production tubewells discontinues. This situation occurred during the 2002 floods in many paurashavas.

The biggest challenge is the scale of disaster which leaves hundreds of thousands of people affected. Another issue is that most of the actions taken are during the emergency and recovery periods. This causes delay in response time and delivery of insufficient spare parts and other supplies for repair and relief.

3.10.5 Action Points on Environment, Climate Change and Disaster Management

The general action points are mentioned first followed by issue specific action points:

General Action Points

- Develop suitable regulation for the WSS sector and set up systems for enforcement of such regulations. Regulation of the water sector will imply joint efforts with other (sub) sectors such as water resources and agriculture;
- Build capacity of and coordination among the sector institutions. A center for training and disseminating related information should be set up on a priority basis. An existing institution, such as ITN-BUET, may be entrusted with the responsibility to lead training, gathering information and sharing best practices;
- Create specialized units within sector agencies like WASAs and the DPHE for dealing with environment, climate change and disaster management, and providing training on those subjects;
- Build community capacities and resilience through raising awareness and training; and
- Take up R&D activities and pilot projects on climate change and disaster-resilient WSS technologies, considering the needs of people, particularly the women, children and the physically challenged persons in the affected areas.

Action Points Specific to Environment

- Initiate amendment to the Environment Conservation Rules of 1997 to revise the drinking water standards, include more detailed surface water standards, revise point source discharge standards and include sewage treatment plants in the industrial emission standards. This may be initiated by the LGD and forwarded to the MoFE; and
- Pursue and coordinate water pollution control, especially in areas around large cities. The proposed Secretaries' Committee on Water and Sanitation is expected to take a lead role (see Chapter 7).

Action Points Specific to Climate Change

The recommendations related to climate change are:

- Climate change adaptation should be included in the updated national policies and strategies and revised development projects;
- A framework needs to be developed for screening planned sector investments and ensuring financing for adaptation to climate change. The framework could be embedded within the usual environmental appraisals (for example, Environmental Impact Assessment) because of interrelationships of several parameters of climate change with environment; and
- Introduce a regular monitoring system on sea level rising, saline water intrusion, depletion of the groundwater level, flow reduction in rivers, and change in rainfall patterns to forecast adaptation approaches of WSS.

Action Points Specific to Disaster Management

- Create a special fund for disaster management within the sector institutions (government and NGOs). Government agencies like the DPHE, WASAs and the LGED may create a separate budget line in the revenue budget and/or formulate projects out of the development budget;
- Strengthen disaster preparedness by proper planning, preparing the Standard Operating Procedure (SOP) during disasters such as rapid assessment and interventions, and maintaining stock of spare parts in strategic locations. Activate WASH Emergency cluster[48] and develop a contingency plan of all the stakeholders for disaster management;
- Construct a few water and sanitation installations at least in the disaster-prone areas, which are resistant to disaster and which can be used by people of the locality during an emergency. All future community constructions like schools and so on should be made addressing the disaster which can be used as shelter with safe WSS facilities;
- Simplify the administrative procedures during the warning and emergency periods by delegation of more authority to the local staff. Relax the procurement rules to manage emergency. Take early steps such as mobilizing staff, vehicles and supplies during the warning period;
- Coordinate with local administration, NGOs and other agencies, specifically through the local DMCs for an effective response. Ensure during warning time that the water and sanitation facilities are functioning in strategic locations like cyclone shelters; and
- Consider hygiene promotion and the special needs of the women and the children.

3.11 Research and Development

3.11.1 Introduction

While Research and Development (R&D) is an important tool for ensuring equitable and sustainable development of natural resources sectors, it is more so for the WSS sector because of its invaluable contribution to the sustenance of life, mainly in the form of safe drinking water. In addition, appropriate and timely R&D on WSS activities could be a means of striking a balance among the competing demands on the finite supply of water from multiple sectors, particularly agriculture and industry. The R&D on sanitation, which is also dependent on sustainable supply of safe water, is equally important for the well-being of individuals, especially children and elders who are susceptible to a variety of diseases arising from unhygienic sanitary practices.

The NPSWSS recommends "improvement of the existing technologies and conducting of continuous research and development activities to develop new technologies." Great importance is also given in NAMIP and the NSS. At the regional level too, the R&D is a high priority. The August 2009 Inter Country Working Group on the SACOSAN[49] meeting in New Delhi urged the member countries, including Bangladesh, to identify new areas of the R&D on cost-effective and sustainable sanitation

[48] A network of NGOs having work plans for water, sanitation and hygiene (WASH) related disaster management. WASH Emergency Cluster is co-chaired by DPHE and UNICEF; the WASH Cluster members prepare themselves to support the national and local disaster management initiatives in line with the SOD 2010.
[49] South Asian Conference on Sanitation

technologies. Further, the possible impact of climate change, particularly saline water intrusion in the coastal areas due to sea level rise, increased stress in water resources, and more frequent natural disasters, demands more R&D on adaptation of technologies and mitigation measures.

3.11.2 Organizations and Activities

The following section summarizes the mandate and activities regarding R&D by the public and semi-autonomous, private and NGO sectors.

In the DPHE, the responsibility of the R&D is currently vested with its R&D Division. The division is carrying out activities to improve the performance of alternative technologies such as the PSFs, rainwater harvesting, iron and manganese removal units, and deep set pumps in areas where the groundwater level is low. The LGED has its R&D Wing and carries out R&D in the WSS that focuses on promotion of the private sector, cost recovery mechanisms, and services to slum dwellers in urban areas. The BCSIR under the Ministry of Science and Technology works in the areas of research on verification and certification of arsenic mitigation technologies. The WASAs do not have any section responsible for R&D; neither do the city corporations and other LGIs.

Several public and private universities carry out technical research on WSS through their Environmental Science or Engineering Department in the form of specific studies and post-graduate research. The ITN[50] works on capacity building of the WSS sector, and the R&D is one of its important functions. It conducts research on both social (for example, community participation, gender and communication) and technological developments. Some important recent work in collaboration with sector partners is on water conservation and water quality surveillance.

A limited number of NGOs like BRAC, WaterAid, NGO Forum, and the DSK conduct studies mainly on communications and behavioral change, and development of community-based systems. They also carry out research activities on citizens' actions, community-led water and sanitation, and modalities to ensure poor people's participation in the decision-making processes.

3.11.3 Issues and Constraints

There is a pressing need for the R&D to provide solutions to some persistent problems in the WSS sector. Widespread arsenic contamination was detected in tubewell water in the early 1990s but a practical solution is yet to be found. Excessive iron and manganese in water from many tubewells are other water quality problems that need to be solved. Water supply coverage gaps remain in some areas like coastal belts where there is no feasible groundwater or surface water source. Lack of appropriate sanitation technologies for the urban areas is a burning issue. There is also a need to better understand behavioral changes for designing more effective, targeted hygiene promotion measures. In addition, there is the emerging problem of falling groundwater levels in vast parts of the country, new types of tubewell technology (for example, deep set pump technology), or solar power driven submergible pumps are required.

There have been several R&D initiatives to address the outstanding problems but the results have been mixed. There have been several research initiatives to develop arsenic removal technologies by

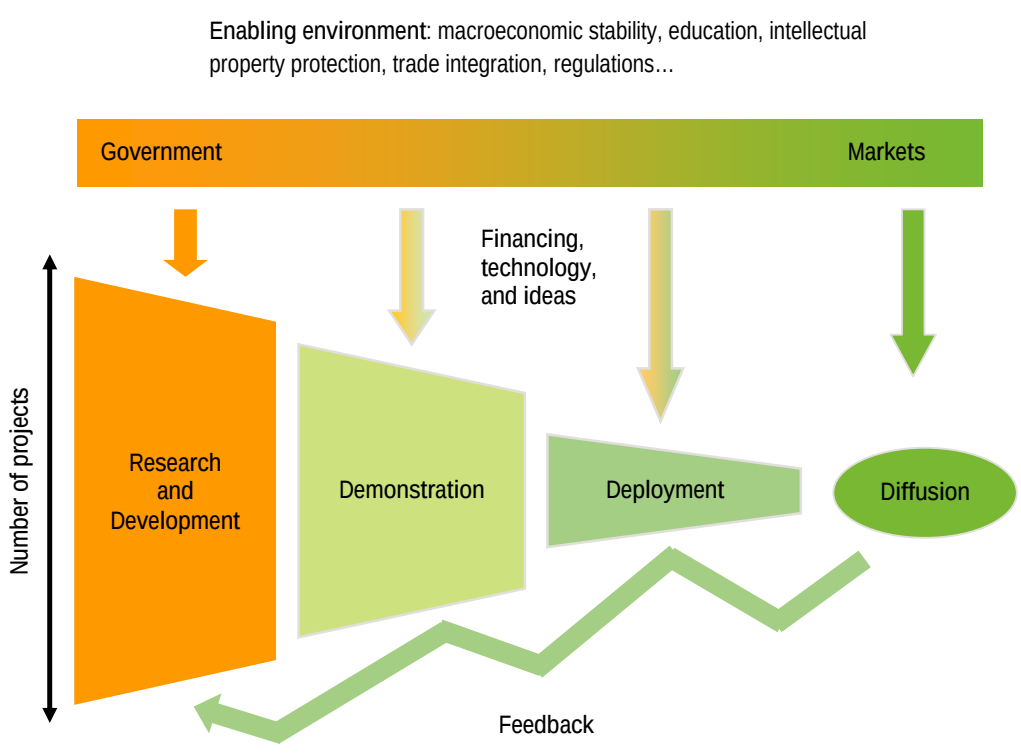
[50] ITN is housed within BUET.

international and national universities and research institutes. While the laboratory scale experiments showed promising results, they were not very successful in field applications. Similarly, iron removal plants (IRPs) have been successful at the demonstration level, but they are yet to be widely accepted by the rural communities. Further, rainwater harvesting units have showed potential of wider use at pilot and demonstration stages, but are yet to enter the market.

Traditionally, it is believed that the R&D followed by demonstration and deployment would lead to diffusion or market development. However, that is not always the case. Innovation is a complex process requiring a favorable enabling environment, including supportive government policies (Box 3.19).

Research activities in the WSS sector in Bangladesh are fragmented and limited to only few organizations. There is shortage of personnel with skills in research techniques and methodology. Lack of institutional support and dearth of equipment are other limitations. Further, effective coordination and proper dissemination do not always take place. The R&D is neither recognized well nor managed in a professional way to take the sector forward. This issue is reflected in the negligible budget provision and the low priority attached to the R&D in the government agencies. A case in point is that the R&D Division in the DPHE has been discontinued in DPHE's new organizational structure.

Box 3.19: Innovation is a tricky process that can be promoted by the policies to address a complex system.



Traditionally, innovation is considered a linear process that perceives innovation as happening in four consecutive stages:

- R&D, to find solutions to specific technical problems and apply them to new technologies;
- Demonstration projects, to further adapt the technology and demonstrate its functioning in larger-scale and real-world applications;
- Deployment, once the fundamental technical barriers have been resolved and the commercial potential of a technology becomes apparent; and
- Diffusion, when technology becomes competitive in the market.

Feedback from manufacturers at the deployment stage, or from retailers and consumers at the diffusion stage, trickles back to the earlier stages, completely modifying the course of innovation, leading to new, unexpected ideas and products, and sometimes to unforeseen costs.

However, experience has shown that the process of innovation is much more complex. Most innovations fail at one stage or another. For example, a number of arsenic removal technologies in Bangladesh were laboratory tested, certified by the government and demonstrated in the field through projects with the expectation that because of the high demand for arsenic removal technologies the market would pick up spontaneously for their wider application or diffusion. However, in reality, this did not happen due to various reasons including the absence of a reliable system for supply of filter media that is required to be changed after a year or so. There were also some problems related to their O&M. The evaluation and testing findings during the testing and development stage were not disseminated to the producers which could have lead to improving their products (Evaluation Report of the Pilot Project on Water Safety Plan for Arsenic Removal Technologies, Devcon 2009. Prepared for DPHE and the Canadian International Development Agency (CIDA)).

On the other hand, a successful example of R&D is the rapid increase in sanitation coverage by installing millions of latrines purchased from sanitation manufacturers. DPHE carried out R&D, demonstrated and deployed latrines by providing subsidy through different development projects. DPHE and some NGOs provided training to local masons and shops to construct latrines. Supported by favorable government policies, the sanitation manufacturers, in parallel to DPHE's development projects, started to replicate the DPHE models and also came out with other options to meet the diversified needs of the people. In this way, the private sanitation manufacturers were able to respond to the large market that was created by the sanitation campaign spearheaded by the government.

Thus, an enabling environment, including policies, affects every stage of innovation. It is not always the case that innovation can be managed simply by supplying more research inputs (technology push) and creating market demand (market pull). While both types of policies are extremely important, the contributions of the numerous interactions among the actors involved in the different stages of innovation--- firms, consumers, governments, universities, and the like--- need to be recognized. Effective policies must view innovation as part of a system and find ways to stimulate all these facets of the innovation process, particularly where there are market gaps.

Source: The World Bank, 2010. World Development Report, 2010.

3.11.4 Action Points on Research and Development

In order to conduct the R&D activities properly and gain benefits from their results, the following should be done.

- Create an enabling environment, including effective implementation of policies and strategies, to promote the R&D and the subsequent stages of demonstration, deployment and diffusion or market development;
- Collect all WSS-related research documents and disseminate findings and recommendations to all sector stakeholders;
- Increase the scope of research (Box 3.20). The R&D activities may be incorporated in technical assistance and development projects with more activities and higher budget allocations;
- Create a dedicated "R&D Fund" to increase the funding for the R&D and create opportunities for interested researchers. The fund may be financed by the government, DPs and the private sector. The Fund may request proposals on specific subjects and also be "open to" proposals. It will arrange to disseminate results. The R&D Fund should be governed by an independent board and preferably be anchored with a suitable organization like a BCSIR or a university;
- Streamline research management. This would include identification and prioritization of research topics, assessment of effectiveness and dissemination of results. Prepare research needs assessment for fundamental research, applied research and extension research;
- Build partnerships with international institutes and create a network of national and international professionals. Incorporate the R&D on the WSS in the post-graduation curriculum at the national universities to get better research outputs;
- Increase human resources and institutional capacities in research. This would include training and guidance programs, arranging equipment and proper testing facilities, and institutional support and coordination;
- Retain the earlier R&D Division of the DPHE and further strengthen its activities including having more staff and higher budget allocations;
- Link research results with the private sector; and
- Promote bottom-up horizontal learning processes that foster innovation of theory based on the replication of innovative local practices.

Box 3.20: Some key topics of the current and new R&D

Water Supply

- Arsenic removal technologies, including in-situ removal of arsenic, and development of locally manufactured arsenic test kits;
- Artificial recharge of groundwater, particularly around Dhaka and in Barind areas, and in the first aquifer in the coastal areas (for shallow shrouded tubewells);
- Community-based iron, manganese and salinity removal technologies and improved handpumps for very low water levels, surface water treatment technologies and rainwater harvesting;
- Use of electricity driven submergible pumps where the groundwater levels are falling excessively and the manual deep set handpumps are becoming difficult to operate; and
- Rural piped water supply schemes and conjunctive use of water.

Sanitation

- Appropriate sewerage systems for cities and towns in Bangladesh;
- Appropriate sanitation technologies for flood prone, high water table and hilly areas, and high density urban slums, and sanitation options for higher level technologies for rural areas and decentralized wastewater treatment; and
- Groundwater contamination due to onsite sanitation, arsenic or other pollutants.

Cross-cutting

- Appropriate water and sanitation technologies for people with disabilities;
- Devolution of planning and management like Union Parishad infrastructure planning and financing mechanisms;
- Cross-cutting issues like community participation, gender parity and financing mechanism;
- Climate change impact and adaptation technologies;
- (IEC materials for an integrated package to develop community capacity in hygiene, safe water, environmental sanitation and proper O&M; and
- Market research on acceptability of new products.

3.12 Chittagong Hill Tracts

3.12.1 Introduction

Chittagong Hill Tracts (CHT) region comprises three districts: Rangamati, Khagrachhari, and Bandarban, and differs from the rest of Bangladesh in history, topography, ethnic composition, social organization, religion and way of life. The CHT occupies a physical area of 13,295 sq km, constituting about 10 percent of the total land area of Bangladesh. About 1.16 million people living in the CHT include about 50 percent ethnic minorities divided into 13 main tribal groups - Chakma, Marma, Tripura, Tanchangya, Mro, Murung, Lushai, Khumi, Chak, Khyang, Bawm, Pankhua, and Reang. There are 112 Unions and seven paurashavas in the CHT. With difficult geographic and hydrogeological conditions, the CHT can be divided into two broad ecological zones: (a) hilly areas; and (b) agricultural plains.

3.12.2 Institutional Setup

The institutional setup of the CHT is quite different from that in other parts of Bangladesh. There is a traditional system of tribal administration (that is, the Kingships of Chakma, Bomang and Maung). Following the CHT Peace Accord 1997, besides national government systems (that is, District Commissioner at the district level and Upazila Nirbahi Officer at the upazila level), the CHT Regional Council (RC) and three Hill District Councils (HDCs) were established for administrative and development matters. A separate ministry, the Ministry of CHT Affairs, was also established according to the provisions of the CHT Peace Accord. The CHT RC and HDCs work under this Ministry. Following the establishment of the HDCs, 18 government departments and agencies, including the DPHE, were deputed under the HDCs as transferred subjects.

The present form of institutional arrangement for the CHT is complex, particularly for delivering the WSS services. The sector planning, budgeting and allocation functions are carried out by the LGD, while implementation of activities at the local level is carried out by the DPHE. The CHT district-level DPHE Executive Engineers work under direct supervision of the HDCs, but their programs and activities are coordinated by the DPHE Superintendent Engineer, CHT Circle (located in Chittagong). An issue that has often been raised is that voices of the local people, particularly of the ethnic minor communities, are not appropriately reflected in the central government's plans and budgets. Also, there is ambiguity in the roles of the Ministry of CHT Affairs in planning and management of the WSS programs in the CHT.

3.12.3 Water Supply and Sanitation Status

Water Supply

The water supply coverage in the CHT is lower than the rest of the country (for example, according to JMP definition (MICS report 2009), 59 percent of the household have access to improved drinking water sources in the CHT compared to the 85.5 percent national coverage). This percentage is the highest in Khagrachhari (76 percent) followed by Bandarban (48 percent) and Rangamati (47 percent). About 46 percent of the households have primary/self-owned drinking water sources and 13 percent use drinking water from alternative/shared sources. During the dry season when water is scarce, *charra* (local name of a stream) is the main source of drinking water. However, the water quality of many *charras* is deteriorating due to environmental degradation and growing habitation.

Recently, WaterAid Bangladesh carried out a census of water and sanitation facilities in the CHT.[51]According to the census, people have to fetch water from a distance; this is a significant burden, particularly for the women who have to collect water in the context of the hilly terrain. Considering the criterion of a distance of 50 m between a water source and household,[52] around 66 percent of all households have to collect water from distant sources. In Bandarban, 74 percent of the households are located more than 50 m from the drinking water source.

[51] WaterAid Bangladesh, March 2010: State of Water and Sanitation in Chittagong Hill Tracts: A Census Report.

[52] As per the national Pro-Poor Sanitation Strategy 2005 of the Government of Bangladesh, 50 m is the minimum recommended distance of water service from a household, which is also followed by WaterAid.

The hydrogeology is complex in the CHT. It is not always possible to find a water-bearing aquifer for round-the-year use. Different types of water supply technologies are used, tubewell technology being the dominant type. Other than handpump tubewell technology, alternative technologies that are widely used in the CHT are ring wells, dug wells, gravity flow system, infiltration well, and the RWSs.

Table 3.9 shows the different types of technologies used in the three districts of the CHT. Amongst the three districts, Khagrachhari has around 86 percent shallow tubewells. In the other two districts, alternative technologies are more often used.

Table 3.9: Types of technologies in CHT (percent)

Types of Technologies	Bandarban	Khagrachari	Rangamati	Total
Deep tubewell	27.7	11.6	35.1	18.3
Shallow tubewell	16.1	85.7	23.7	66.3
Ring well	48.3	2.5	36.1	13.5
Piped water supply	1.1	-	0.2	0.1
Tara dev	2.0	0.1	2.7	0.9
Dug well	0.8	-	0.1	0.1
Gravity flow system	2.4	-	0.3	0.2
Gravity flow system/rainwater harvesting	-	-	0.1	-
Rainwater harvesting	-	-	0.1	-
IFG	1.2	-	1.0	0.3
IFW	-	-	0.5	0.1
Water fall	0.4	-	-	-
Others	-	-	0.1	-
Total	**100.0**	**100.0**	**100.0**	**100.0**

Sanitation

The WaterAid Bangladesh (2010) Census shows that about 74 percent of the households in the CHT have their own latrines, whereas 1.3 percent of the households use shared latrines, 0.02 percent of the households use community latrines, and 25 percent of the households use open places to defecate.

According to the JMP definition, the latrines are classified into improved and unimproved categories and the status of sanitation is shown in Table 3.10. Like water supply, sanitation coverage is low in the CHT. According to the WaterAid Bangladesh Census, only 28.6 percent of the households use improved latrines whereas the MICS 2009 survey found the coverage to be 33 percent to 48 percent in the CHT (33 percent in Bandarban, 43 percent in Khagrachhari, and 48 percent in Rangamati).

Table 3.10: Status of the households using improved latrines

Status	Latrine type	Bandarban	Khagrachari	Rangamati	Total
Improved Sanitation	Pit latrine with lid	5.7	1.8	5.4	4.0
	Pit latrine with slab and water seal	7.8	3.7	5.3	5.2
	Pit latrine with slab and without/ broken water seal	5.8	10.8	4.7	7.4
	Offset pit latrine with vent pipe and water/ bend seal	5.2	9.1	13.5	10.0
	Offset pit latrine with vent pipe and without water/ bend seal	0.2	0.0	0.7	0.3
	Offset pit latrine without vent pipe and with water seal	0.2	0.1	0.1	0.1
	Offset pit latrine without vent pipe and with bend seal	0.1	0.0	0.0	0.0
	Offset pit latrine without vent pipe and water/ bend seal	0.0	0.2	0.0	0.1
	Latrine with septic tank	1.4	1.2	1.8	1.5
	Sub-total	**26.4**	**26.9**	**31.6**	**28.6**
Unimproved Sanitation	Pit latrine without lid, hanging/open latrine, open defecation, shared latrine, community latrine and others	73.6	73.1	68.4	71.4
Total		**100.0**	**100.0**	**100.0**	**100.0**

Sanitation is based on indigenous options such as *machang* (hanging latrine). Open defecation is still widely practiced in many areas of the CHT. Installation of conventional sanitation options is very complicated due to difficult transportation and social practices. A large number of people leave their villages for *Jhum* cultivation (cultivation on hill slopes) for a significant number of days in a year. These temporary migrants do not arrange proper sanitation facilities, which consequently create the risk of spreading waterborne diseases among the neighboring localities.

The drainage coverage in the CHT districts (that is, mainly town-based) is very poor. It is common in the CHT that wastewater is disposed of through ponds, ditches, drains and places near the water bodies.

Hygiene Practices

Hygiene practice in the CHT is very poor. People are mostly poor and their livelihood is primarily based on agriculture and forest resources. In many ethnic communities, especially some in Bandarban district, it is the usual practice that human and animals live very closely and animal excreta remain scattered in the immediate neighborhood. Use of latrines for defecation differs

greatly. Young children are not expected to use latrines and their excreta are not thought to be polluting. The MICS 2009 study on the CHT indicates that around 60 percent of adults use some form of constructed latrine for defecation, and around 97 percent of children under the age of five defecate in open places. The people doing safe hygiene practices, especially hand washing with water and soap after defecation, are about 64 percent in Rangamati district, 55 percent in Khagrachari district and 57 percent in Bandarban district. The most common type of latrines in the CHT is made of packed earthen floor or concrete slab (without water seal) with a superstructure of bamboo and reeds. Language is sometimes a barrier to communication as some tribal people who do not know *Bangla* (Bengali) are excluded from the national hygiene promotional campaign through radio or television.

3.12.4 Issues and Action Points

A Working Paper (No. 2) has been prepared specifically for the CHT. The consultation process during preparation of the SDP covered grassroots people, different institutions like the RC, the HDCs, the DPHE officials and the local traditional leaders like *karbaris*. A regional workshop with the CHT stakeholders was organized with the objectives of discussing WSS issues and challenges faced by the CHT communities, and of obtaining inputs for the SDP. The following issues and action points are based on the consultations on CHT:

1. ***Recognizing Diversity:*** Socioeconomic, cultural, linguistic and communication diversities of the CHT have to be specially addressed while designing and implementing development programs. There should be separate sections on the CHT in the national policies and strategies.
2. ***Implementation Arrangements:*** There is a need for clear allocation of roles and responsibilities of the LGD, Ministry of CHT Affairs, including the RC, the HDCs and traditional institutions, and the DPHE. In principle, program and project planning and implementation will be the responsibility of the RC. However, while the RC currently has the capacity to implement programs and projects with the assistance of the DPHE as a transferred subject, the present function of project planning and implementation by the LGD and the DPHE will be gradually transferred to the RC with the development of its capacity. The modalities will be prepared by the LGD (with technical assistance of PSU) and in close consultation with the RC.
3. ***Local Planning and Coordination:*** Location-specific WSS planning and development approaches should be adopted in consultation with local communities, such as para committees, WATSAN committees and traditional leaders. Local-level coordination needs to be strengthened. At present, the DPHE is conducting a feasibility study and preparing a master plan for future WSS in the CHT. This master plan needs to be reviewed every five years to match the changed condition of habitation and development of the areas.
4. ***Choice of Technologies:*** The requirement for alternative technical solutions for water supply (for example, spring development and gravity flow system) should be considered and easy availability of quality hardware materials (both for water supply and sanitation) is recommended. Given the context of the hilly terrain and difficulties in fetching water, appropriate sanitation technologies that require less water and use local resources (like bamboo fencing in latrine pits) need to be adopted. The local cultural needs, communication

difficulties and other socioeconomic diversities should be addressed while considering the appropriate technologies.

5. ***Service Standards:*** Appropriate WSS service standards should be formulated for the CHT, such as the number of people per water option, taking into consideration the dispersed habitation pattern and difficulties in fetching water in the hilly terrain. For example, the number of people using one water point for the CHT could be 25, that is, half of what is recommended for the national level.

6. ***Hygiene Promotion:*** Hygiene promotion should be designed and emphasized in the background of a very low level of hygiene practice in the areas like Bandarban. The behavioral change communication program should be adapted to the local context.

7. ***Research and Development:*** The R&D should be carried out to develop appropriate WSS technologies to address the socioeconomic and cultural diversities and communication difficulties of the CHT area.

8. ***Pollution Control:*** Environmental pollution control measures should be adopted in water bodies, particularly in Kaptai Lake, Rangamati.

9. ***Multi-sector Development Approach:*** The multi-sector development approaches should be adopted while planning for water sources, such as establishing small-scale dams in Khagrachhari and other suitable places, which can be used for water supply as well as for tourism, fisheries and irrigation.

Chapter 4

Legislations, Policies and Strategies

The existing legal framework, policies, strategies and plans for WSS sector are briefly discussed in Chapter 1. This chapter further analyzes these aspects in the light of their appropriateness for the effective governance of the WSS sector, particularly for achieving the objectives of the SDP. The preparation of new legislations, policies and strategies, and the amendments to the existing ones have been identified and accordingly reflected in the Sector Development Framework.

4.1 Legal Framework for Water Supply and Sanitation

The existing legal framework of the WSS sector in Bangladesh consists of acts and ordinances and other legal instruments specifying the functions and responsibilities of various sector organizations. Table 4.1 provides a list of the significant acts and ordinances related to the WSS sector.

Under the provisions of the acts and the ordinances, different rules, regulations, bye-laws and executive orders are prepared by the concerned ministries and agencies. Examples are the DWASA rules and regulations issued at different times and the Paurashava Water Supply Model Bye-Law, 1996.

A review of the existing legal framework[53] reveals that:

- there is an overlap of the roles and responsibilities of sector agencies, for example, between the DPHE and the LGIs (that is, union parishads and paurashavas). There is thus a need for establishing clarity and effectiveness through modification of rules and regulations, and issuance of executive orders by the LGD;
- clarification and streamlining of the roles and responsibilities related to the WSS between the two line agencies under the LGD, that is, the DPHE and the LGED, are required; and
- there is a need for proper enforcement of the existing Local Government Acts, 2009, and making provisions for further delegation of authority. For example, the city corporations and the paurashavas are still not able to recruit staff without prior permission needed from the LGD. There is also a need for further delegation of authority to the city corporations and the paurashavas by the LGD for demarcating, protecting and maintaining water bodies for water supply and the environment including establishment and management of watersheds for water intakes.

[53] UPI (now PSU), 1994: Institutional Review of the Water Supply and Sanitation Sector and Final Report on Dhaka WASA and Paurashava Water Supply Section, December 2009 (under ADB's Management Support for Dhaka WASA).

Table 4.1: Acts, ordinances and other legal instruments governing the Water and Sanitation Sector

Acts and Ordinances and other Legal Instruments	Brief Description
Rules of Business 1996	It allocates responsibilities to different government departments and ministries. It allocates WSS provision in rural and urban areas not declared a municipality to DPHE.
Local Government Acts - Local Government (Paurashava) Act, 2009 - Local Government (City Corporations) Act, 2009 - Upazila Parishad Act, 2009 - Union Parishad Act, 2009	These Acts specify the responsibilities, including those related to water and sanitation, of local government at different levels. In the case of water and sanitation, the responsibilities include provision and maintenance of water supply, sanitation and drainage facilities and preventing pollution of water sources.
WASA Act, 1996	It gives power to the government to establish WASAs in any area. It permits WASAs to carry out works related to water supply, sewage systems, solid waste collection and drainage. It also describes the composition of the WASA Board and delineates responsibilities between the Board and the Managing Director. Presently, WASAs work in Dhaka, Chittagong and Khulna cities.
Environmental Conservancy Act, 1995 Environmental Conservation Rules, 1997	The Act was followed by the Environmental Conservation Rules, 1997, establishing a framework for environmental management and setting environmental quality standards, including water quality standards.
Acts and Ordinances related to public health and hygiene, e.g. - Penal Code 1860 - Public Health (Emergency Provisions) Ordnance, 1944 - Pure Food Ordinance, 1956 - Factory Acts, 1965	The public health concerns are addressed by various legal instruments and controlled locally by the local government entities.

Some acts and other instruments need to be amended to suit the needs of the present situation. For example, according to WASA Act 1996 (Section 22; Sub-Section (2)), WASAs are empowered to increase the water tariff, with the approval of the Board, up to five percent in a financial year, otherwise it has to seek approval from the LGD. It is proposed by WASAs that they be allowed to increase the tariff up to 10 percent to meet the increasing costs and make their operations financially viable. Similarly, the Model Bye-Law (s) of 1996 was prepared under Paurashava Ordinance 1977, but there is no scope of bye-laws in the new Local Government (Paurashava) Act 2009 on matters related to water supply; instead the Act provides for making Regulations.

In order to address the sector challenges, there is a clear need to prepare new acts, regulations and other legal instruments or amend the existing ones. The functions of the WSS sector are also under the purview of and closely related to the broader water resource management, particularly

groundwater management. The need for reform and strengthening groundwater management are discussed in Section 3.3.

4.1.1 Acts and Regulations under Preparation for Water Resources Management

The required acts and regulations related to water resources management, particularly for groundwater which accounts for the bulk of water supply sources, are discussed at first and then those for the WSS.

Bangladesh Water Act

Presently, there is no systematic legal framework to manage the water resources except for regulating groundwater withdrawals in Dhaka, Chittagong and Khulna cities according to the WASA Act, 1996. Bangladesh Water Development Board (BWDB) Act, 2000, assigns the BWDB as the controlling body for surface and ground water resources. Water Resources Planning Act, 1992, assigns WARPO the lead role for the development of water resources. The Ministry of Land owns the rivers and gives permission to build structures on rivers, such as boat landing jetty. However, there is no effective regulation for surface water withdrawal.

The Ministry of Water Resources (MoWR) is drafting the "Bangladesh Water Act" to provide regulations according to the National Water Policy, 1998. According to the present version of the draft Act (2009), it would "*regulate the water resources of Bangladesh in order to facilitate and ensure integrated, equitable and sustainable management, development, and utilization of water resources and their conservation and protection…*" The draft Act describes, among others, the ownership, water appropriation and water use rights including domestic and municipal use. The draft Act, however, focuses on surface water issues and needs to be extended to provide more explicit consideration of groundwater management issues.

However, the following points should be included in the Water Act:

- Elaborating the 'water stressed area' concept to apply to both groundwater quantity and quality issues focusing on: i) declining groundwater levels resulting from either municipal or irrigation abstractions; ii) saline intrusion or migration of arsenic; and iii) industrial or agrochemical pollution;
- Establishing abstraction licensing that should allow for time-bound licenses and exemptions for specific categories of abstraction (for example, domestic handpump tubewells);
- Establishing licensing for well drilling that should allow for time-bound licenses and exemptions for specific categories of drilling technology or well size;
- Establishing a Source Protection Zone as a means of controlling future and present land-use to prevent or reduce pollution of water supplies;
- Protecting large water bodies filled up during monsoon/floods for groundwater recharge naturally or artificially; and
- Establishing legislation to require the cleanup of groundwater pollution based on the polluter-pays principle.

Groundwater Resource Regulation

The regulation of surface water is covered under the draft Water Act. As groundwater issues are covered to a lesser extent in the draft Water Act, the use of which is heavily related to water supply, groundwater resource regulation is elaborated in this section. Moreover, the competitive use of groundwater by the agriculture and WSS sectors further emphasizes the importance of regulation.

Groundwater should also be regulated under the envisaged Water Act. As shown in Figure 4.1 the regulation and management of groundwater could be divided into two broad functions:

> **Resource Regulation:** Set and enforce regulations for groundwater abstraction and protection, and monitor compliance; and
>
> **Abstraction Management:** Provide abstraction licenses, control actual water abstraction, monitor the amount of abstraction, water level and water quality, and protect water sources from pollution.

The roles and responsibilities of different agencies to carry out these two regulatory functions are given below.

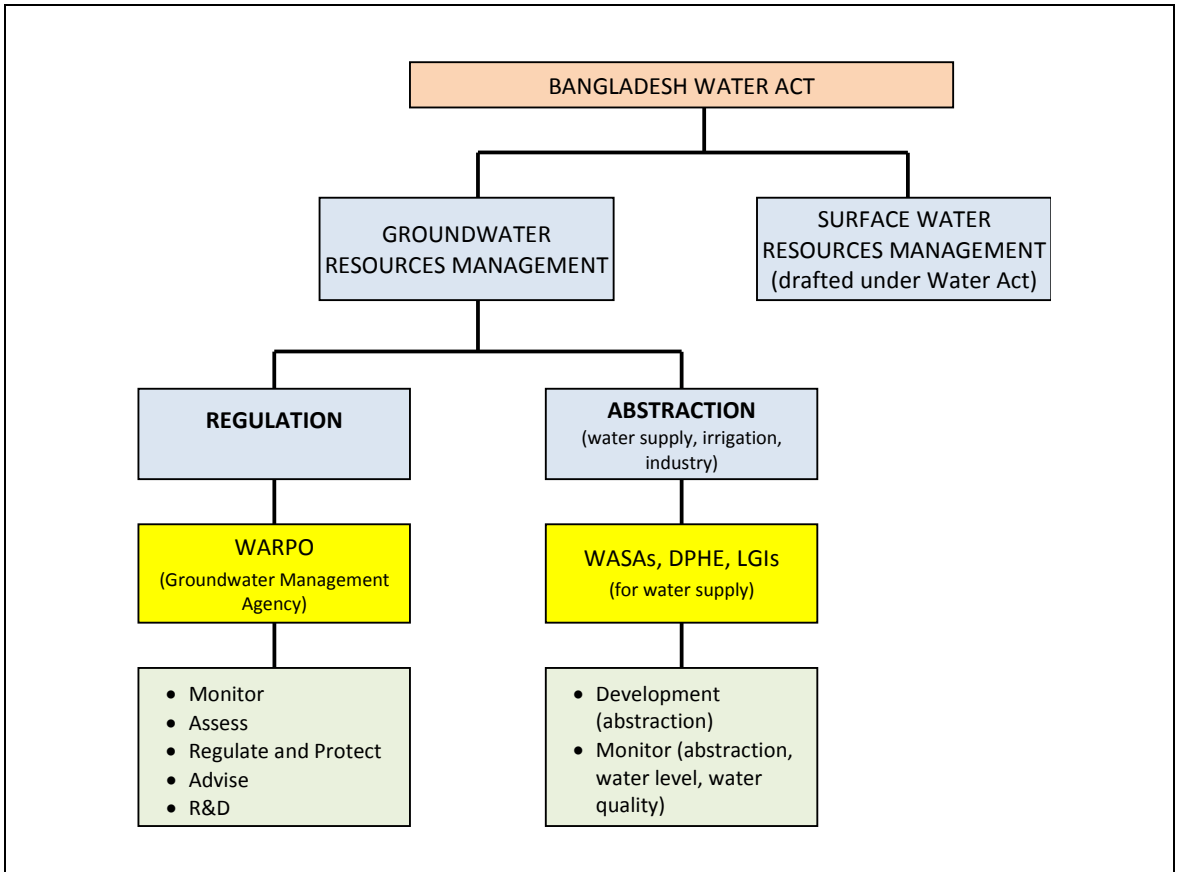


Figure 4.1: Proposed division of functions, roles and responsibilities for groundwater management under the Bangladesh Water Act, 2009

Resource Regulation: A basic principle is that resource regulation should be separated from abstraction management. It should rest within MoWR but should be separate from the agencies that have executive responsibilities for water resource abstraction.

Currently, the organization that comes closest to performing the resource regulation function is WARPO; however, its functions are limited to planning and staffing, and its resources are completely inadequate to carry out the regulatory functions. The Hydrology Wing and Groundwater Circle of the BWDB, which, is responsible, among others, for groundwater monitoring, is well resourced, but its institutional anchorage is incompatible due to the principle of separation of regulation from abstraction. An option for resource regulation is to create a separate groundwater management regulation authority. Considering the complexities in creating a new organization and making it functional, the strengthening of WARPO as a resource regulator in addition to its planning functions, is a practical solution. WARPO will require new staff, training, duties and responsibilities, and powers delegated through legislation. The additional responsibility of WARPO should be incorporated in the proposed Water Act.

Abstraction Management: Various agencies such as the DPHE, WASAs, city corporations, paurashavas and rural piped water supply utilities are engaged in water abstraction for domestic water supply. They would operate under the guidelines set by WARPO. The agencies will also take measures to monitor the quantity of water abstraction, water levels and water quality, and protect water sources from pollution. The roles and responsibilities of the various organizations including private irrigation and private water supply agencies will be delineated in the contemplated National Groundwater Management Strategy.

National Groundwater Management Strategy

An important inter-sectoral issue is groundwater management cutting across the agriculture, water resource, and WSS sectors. As such, a national groundwater strategy should be formulated by MoWR. The strategy should ideally be under the framework of the revised Water Act which is expected to include the groundwater management issues. In the interest of early establishment of regulations, it is suggested that the groundwater strategy should be drafted in parallel with the revision and enactment of the Water Act. This process will enable faster initiation of some essential regulatory elements.

The objective of the groundwater strategy is to describe the appropriate use of groundwater, ensure equitable distribution of the water among various users, and streamline the different development functions related to groundwater management. The strategy would emphasize integrated water resource management and a water safety framework, and ensure that regulations and other measures are in place to protect against over-exploitation and pollution. It would create an enabling environment through establishing a sound institutional development platform where the roles and responsibilities of stakeholders are clearly delineated, and knowledge and capacity building are promoted.

4.1.2 Proposed New Acts and Regulations for Water Supply and Sanitation

To meet the WSS sector challenges, reforms are needed in two areas as follows:

- institutional and organizational development of the service providing agencies (for example, WASAs, DPHE, PWSS and private operators);[54] and
- establishment of a regulatory framework.

These two are heavily intertwined. A regulatory framework cannot usually succeed without institutionally developed utilities. The primary objective of establishing a regulatory framework for the WSS sector is to ensure the provision of water and sanitation services in an efficient, transparent and equitable manner, whether they are provided by private or public sector providers. A key principle of the regulatory framework is clear separation of *policy*, *regulation*, and *service delivery* functions of the respective agencies. As demonstrated in many countries, adherence to this principle by the WSS sector agencies could lead to substantial beneficial impacts. For example, it could insulate public sector providers from political interference in the case of enhancement of tariffs, thereby contributing to their financial viability. Moreover, an independent regulatory body could safeguard the interests of consumers by ensuring that tariffs are not discriminatory or prohibitive, or protect poor people by supporting a case for subsidies.

Water Services Act

To meet the objective of formulating a regulatory framework, the WSS sector would require a Water Services Act, which would be drafted by the LGD. The Act would also facilitate creation of a Water Supply Regulatory Commission (explained in next Section). It is important to keep the initial Water Services Act relatively simple, as the system setup will certainly need to be adjusted after several years of experience. Further, at the initial stage the Act should focus mainly on public service providers (for example, WASAs, PWSSs, and city corporations) since it is unlikely that there will be an advanced level of private sector participation (for example, full concessions) in the immediate future.

An outline of the topics that should be covered in the Water Services Act is given below:

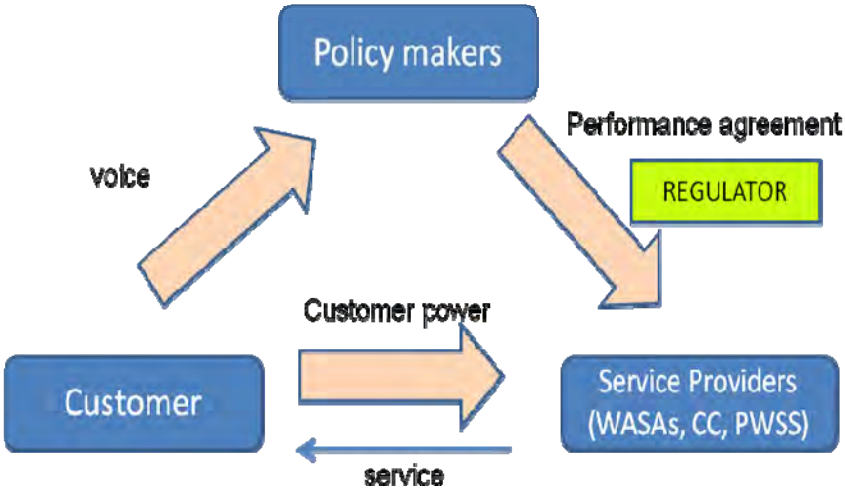
- overall framework for WSS services;
- responsibilities of different entities: policy makers, regulator, and WSS service providers;
- service standards and water supply tariff fixation;
- customer interface and information;
- private sector participation;
- offenses, enforcement, dispute resolution and appeals procedures; and
- Technical and financial standards.

Water Services Regulation

The main objective of the regulation is to ensure fairness among the stakeholders, principally the customers and the service providers (Box 4.1).

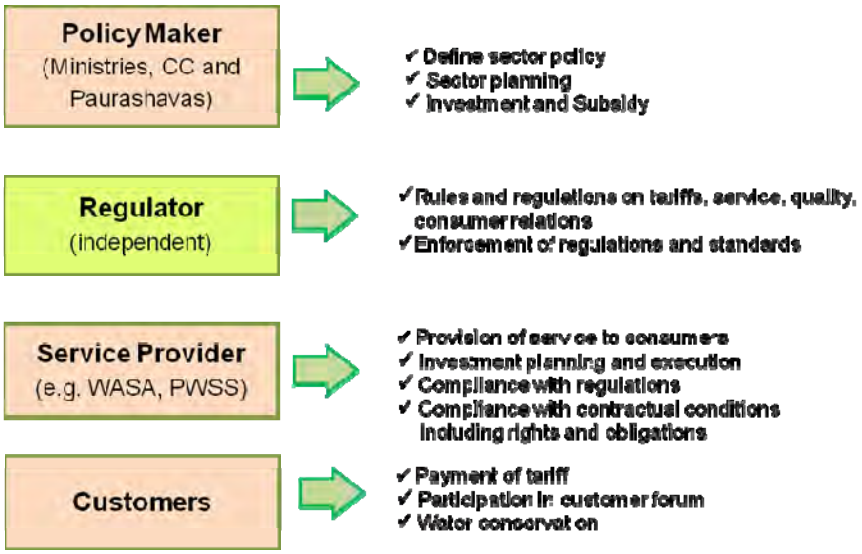
[54] Discussed in detail in Chapter 5.

Box 4.1: Accountability relationship among the three major players: policy makers, service providers and customers



Source: Adapted from the World Development Report 2004, World Bank

The main objective of regulation is to ensure fairness among stakeholders, principally the customers and the service provider.



There is a need for clear roles and responsibilities of policy makers, service providers, customers, and the regulator

Specifically, the regulatory systems are intended to serve the following purposes of:

- ensuring compliance with standards of acceptable service;
- setting tariffs that should provide sufficient revenue for service providers to achieve the service standards;
- monitoring performance, and determining whether the service providers are in compliance with the service standards, and taking appropriate actions if they are not;
- protecting the environment and natural resources; and
- providing certainty for private sector participation.

As part of the SDP preparation process, an ADB-financed study (2009) examined the feasibility of establishing a regulatory framework for the WSS sector in Bangladesh. The study reviewed, among others, the existing regulatory frameworks of the energy and telecom sectors in Bangladesh and international experiences, particularly those of regional countries (Box 4.2).

Box 4.2: International experiences on the preconditions for effective regulation

i. *Not too many regulatees need frequent performance validation*. Many countries with regulatory bodies have a few regulatees. Nepal, Thailand, Sri Lanka, Malaysia, Australia, UK, and USA regulators have no more than 30 utilities each to regulate.

ii. *Regulatory bodies must have some "workable" independence*. The main reason for the creation of an independent regulatory body is to insulate the sector from political interventions. If this regulatory body were to be subservient to political decisions *at all times,* then there is little value for its existence.

iii. *Must have authority to implement its rules/decisions*. It should have the regulatory powers and tools to enforce service and institutional performance standards. Authority must include the right to cancel licenses to operate and impose fines. If it has no such provisions, then no one will follow it.

iv. *Must have trained and experienced staff*.

Source: Antonio R. De Vera, ADB Regulatory Specialist Consultant, November 2009: Recommendation for a Regulatory Framework for Bangladesh.

The study concluded that the creation of a full-fledged regulatory body at the present stage would be premature. The establishment of the regulatory body would be gradual and take place in two stages as follows:

- The first stage would be the creation of a **Water Supply Cell** (similar to the Power Cell) within the LGD, which will have the function of leading the reform initiatives for utilities and preparing sector conditions for the establishing a Water Supply and Sanitation Regulatory Commission. The Water Cell could be incorporated in the PSU to reduce time for its creation and for better coordination and synergy with the functions of the PSU which is also involved in policy implementation; and
- The second stage would involve the creation of an independent **Water Supply and Sanitation Regulatory Commission**. The stage would develop after three - five years when sector conditions are conducive to justify the establishment of a Commission.

The functions of the Water Supply Cell would be along the following lines:

Preparation of sector conditions: i) advocating for institutional and organizational reforms to develop the different utilities institutionally and operationally, including setting standardized commercial practices and billing and collection systems; ii) pursuing legislative reforms to enhance WASAs' and PWSSs' effective autonomy; iii) conducting studies such as rationalization of utility subsidies and establishment of regional utilities to make the utilities financially more viable; and iv) facilitating the drafting and enactment of the Water Services Act.

Regulatory role: i) preparing service and performance standards, including water safety framework rules on a yearly basis (a "time profile"); ii) preparing formats for reporting, business plans and select appropriate key performance indicators; and iii) setting a monitoring system, monitoring and validating performance of utilities, establishing a database, and benchmarking the utilities.

The Water Supply and Sanitation Regulatory Commission will cover all piped-water supply schemes in the urban areas. Priority in introducing the regulations will be given to WASAs, city corporations and the large municipalities. The DPHE will act as a regulator, under the guidance of the Commission, in piped water supply schemes in urban growth centers and in rural areas, and in other rural water supply schemes where it is not directly involved in service delivery.

4.2 National Policies and Strategies for Water Supply and Sanitation

The policies and the strategies that govern the WSS sector have been introduced in Chapter 1. A further analysis and identification of the need for new policies and strategies or modification of the existing ones are given below.

4.2.1 National Policies

Two policies currently prevail in the WSS sector:

- National Policy for Safe Water Supply and Sanitation (NPSWSS) 1998; and
- National Policy for Arsenic Mitigation and Implementation Plan (NAMIP) 2004.

The appropriateness of the two policies to face the present and future challenges is discussed below.

National Policy for Safe Water Supply and Sanitation (NPSWSS) 1998

The implementation of the National Policy for Safe Water Supply and Sanitation (NPSWSS) could have improved, had it been accompanied by a concrete timeframe, financial allocations and government directives. Moreover, as the NPSWSS was prepared more than a decade ago, it did not reflect some new sector issues like climate change and the Water Safety Plan. However, it is found that the policy, in general, addresses the outstanding issues in the sector. Nonetheless, the policy is flexible and does not prevent actions to address the outstanding and new developments.

As such, for practical reasons, no new policies or modifications are required at this moment. The NPSWSS could remain unchanged but, under its framework, there is a need to develop some strategies to face the existing and emerging sector challenges. An assessment of the policy is given below:

- It sets the coverage targets for rural water supply in terms of average coverage of the number of users per tubewells, and the overall coverage in percentages for urban areas. Both the rural and urban coverage levels do not bridge the gaps in terms of quality of service;
- It sets the targets for coverage levels, but does not provide any timeframe nor any indication of resource availability;

- It mentions decentralization of administrative and financial authorities to the LGIs, but the actual modalities for decentralization are not provided;
- It does not highlight the requirement for a regulating authority, especially for the WSS sector. However, a general requirement for a regulatory framework for groundwater abstraction (for irrigation) has been proposed in the NWMP;
- It delineates the roles and responsibilities of government agencies, the private sector and NGOs. It recognizes the DPHE as the lead sector agency and also suggests the roles of the LGED in donor-supported projects which include water and sanitation. However, the institutional arrangements between the national government agencies (DPHE, and LGED) and the LGIs (union parishads, paurashavas and city corporations) are only suggestive in the policies. The roles and responsibilities are not clearly defined through subsequent strategies or government directives;
- It does not provide a mechanism for well-defined coordination among different sector stakeholders from the community to the central level; and
- It was formulated more than a decade ago. Subsequently, some important issues like climate change, and Water Safety Plan have emerged and increased an emphasis on hygiene promotion, which need to be incorporated.

The action points on the two policies are narrated below.

Action Points: **National Policy for Safe Water Supply and Sanitation (NPSWSS) 1998**

Given the above analysis, it was found that the policy, in general, addresses the outstanding issues in the sector. Nonetheless, the policy is flexible and does not prevent actions to address outstanding and new developments. As such, for practical reasons, no new policies or modifications are required at this moment. The NPSWSS could remain unchanged but, under its framework, there is a need to develop some strategies to meet the existing and emerging sector challenges (described in next Section).

Action Points: National Policy and Implementation Plan for Arsenic Mitigation 2004

Attaching top priority to the problem of arsenic in drinking water, GoB adopted NPAM 2004 and the Implementation Plan for Arsenic Mitigation in Bangladesh (IPAM 2004). The policy provides guidelines for arsenic mitigation in the drinking water, health and agriculture sectors. Since 2004, following implementation of several research and investment projects, knowledge on arsenic contamination, its risks and mitigation options, have improved significantly.

A review (WSP, 2009) of the National Policy and Implementation Plan for Arsenic Mitigation 2004 was carried out and it suggested that the National Policy for Arsenic Mitigation 2004 should remain intact, but its associated Implementation Plans should be separated and developed.[55] As shown in Figure 4.2, each of the key ministries – agriculture, health, local government (for water supply), and water resources – should develop separate implementation plans for arsenic mitigation. This suggestion was agreed in principle in the National Forum for Water Supply. As next steps, it should be processed to the Cabinet Division for approval.

[55] Peter Ravenscroft and Kazi Matin Ahmed, WSP, 2009: Implementation Plan for Arsenic Mitigation (IPAM) In Bangladesh: Recommendations for a Revised Implementation Plan for Arsenic Mitigation (IPAM 2009).

A draft Implementation Plan for Arsenic Mitigation for Water Supply (IPAM-WS) was also developed by the WSP review. This draft should be reviewed by the sector stakeholders and forwarded by LGD to the Secretaries' Committee on Arsenic or Cabinet Division for approval. The Implementation Plan should also be in line with the recommendation of the recent JICA study (2009) on arsenic.

The WSP review suggested that coordination on arsenic issues between the sectors should be carried out through the Secretaries' Committee on Arsenic. The creation of an arsenic mitigation fund has also been proposed to fund the arsenic implementation plans developed by the various ministries and to drive improved coordination in the implementation of those plans. It is also recommended that the scope of the Committee be increased to include water resource management issues and that the committee be renamed as "Secretaries' Committee on Water Supply and Sanitation."

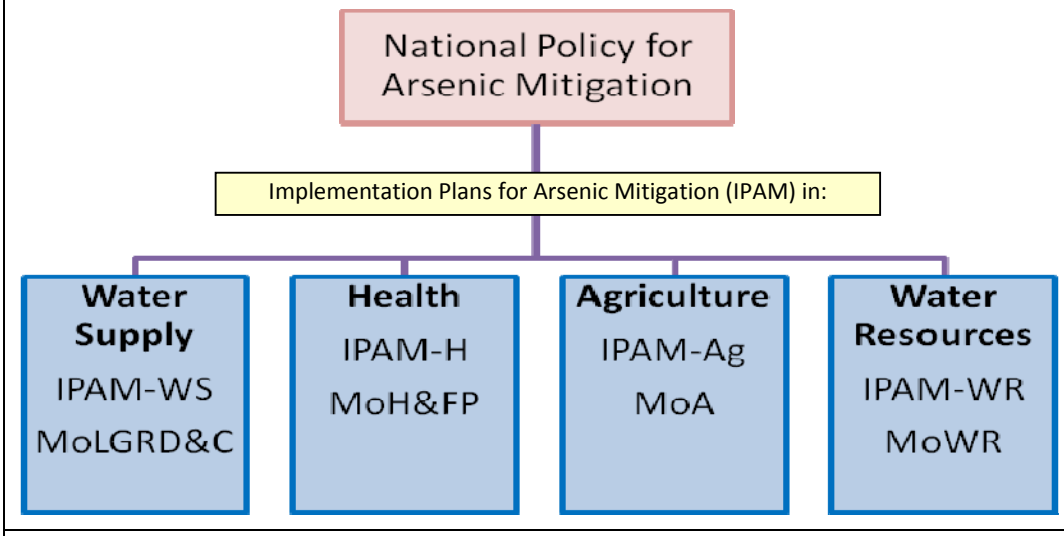


Figure 4.2: Organization of policy and plans for arsenic mitigation

4.2.2 National Strategies for Water Supply and Sanitation

Under the framework of the above two policies, there are three existing strategies and some new ones are under preparation. These strategies address specific sector issues or themes. The existing strategies and the ones under preparation are given below.

Existing:

- National Sanitation Strategy (NSS), 2005
- Pro-Poor Strategy for Water and Sanitation Sector in Bangladesh (PPSWSS), 2005
- Cost Sharing Strategy for Water and Sanitation Services in Bangladesh, 2011[56]

[56] Was approved during the final stages of SDP preparation

Under preparation:

- National Strategy for Water and Sanitation for Hard to Reach Areas and People of Bangladesh; and
- National Strategy for Hygiene Promotion

However, all sector themes or issues are not covered under the above strategies. For example, there is a strategy for sanitation, but not for water supply. Nonetheless the presence of several strategies in the WSS sector often creates confusion when carrying out development activities in a rural or an urban area. Likewise, it is a burden on the staff as several strategies need to be consulted. Thus all the strategies should to be streamlined and recast into two specific strategies for the two subsectors:

- National Strategy for Urban Water Supply and Sanitation; and
- National Strategy for Rural Water Supply and Sanitation.

While the strategies should be flexible to adapt to the emerging issues, they should be reviewed and updated at least once every five years. The strategies would be followed by all stakeholders, including government agencies, the NGOs and the private sector. The need for the above strategies was discussed and agreed upon with the main sector stakeholders in the five exclusive workshops with the LGD, the DPHE, WASAs, the city corporations and the paurashavas (see Annex 6).

National Strategy for Urban Water Supply and Sanitation

The strategy would clearly delineate the roles and responsibilities of the LGD, the DPHE, the LGED, WASAs, city corporations and paurashavas, the private sector and the NGOs in the development of the WSS sector. It will outline a reform and capacity building agenda with milestones. Some of the elements of the strategy will be general andapplicable to all urban areas, while others will be specific to WASAs, city corporations and the paurashavas. The CHT, being unique in the administrative and sociocultural context, also needs specific elements. These are given below.

General:

- Take immediate measures to improve the operational and management efficiencies by: i) reducing UfW to at least 25 percent by 2015 and 20 percent by 2020; ii) identifying and taking actions against illegal connections and leakage, and controlling waste; iii) replacing old and defective pipelines; and iv) introducing distribution zone management, including installation of bulk meters at sources and zones;
- Involve communities in program design and O&M including the Water Safety Plan;
- Pay special attention to addressing the needs of low income communities;
- Install water meters for all customers and establish progressive water tariffs that reflect the true costs of services, while providing a safety net for the poor;
- Ensure application of the IEC Guidelines for WASH promotion by all sector partners;
- Carry out the R&D to develop appropriate technologies to address the diversified needs;

- Set up a monitoring and coordination mechanism at community, local government and central levels;
- Build capacities of the sector institutions and communities to protect the environment, adapt to climate change and build resilience for disaster management; and
- Support and encourage the private sector to take up a greater role in the future.

WASA-Specific:

- Implement the Partnership Framework to strengthen governance and organizational structure, improve financial management capacity, and sustain service delivery.

City Corporations and Paurashavas Specific:

- Develop a database by conducting a baseline survey and regularly update it;
- Establish a dedicated "Fund" for development of WSS services, which could be accessed based on service providers' performance;
- Provide the DPHE support for the city corporations and the paurashavas to: i) prepare master plans, including a land use plan; ii) build operational and financial management capacities; iii) install water meters; iv) repair pipelines, control wastage and leakage, and upgrade the water supply systems; v) develop consumer care and customer relationship; and vi) improve management of sludge from septic tanks and pit latrines; and
- Introduce, on a priority basis, outsourcing for tariff collection with power of disconnection.

Chittagong Hill Tracts Specific:

The CHT-related strategic elements are elaborated in Section 3.12.4 and need to be considered in preparing the strategy.

National Strategy for Rural Water Supply and Sanitation

As in the urban sub-sector, an appropriate strategy for a comprehensive and focused development is required in the rural sub-sector. The elements of the rural strategy which are general in nature are given below. As mentioned above, the specific elements for the CHT also need to be considered for the rural strategy.

- Take immediate actions for arsenic mitigation in the highly arsenic-contaminated areas identified by the the DPHE-JICA Study 2010;
- Continue encouraging the private sector as a major player in the rural WSS;
- Prepare development plans for the union parishads;
- Adapt different approaches to address mainly two different types of water and sanitation needs: i) problems which are geographically widespread (for example, arsenic and lowering of groundwater levels); and ii) specific problems of various nature (for example, hard-to-reach areas and the vulnerable groups);
- Ensure application of the IEC Guidelines to WASH promotion by all sector partners;

- Ensure DPHE's withdrawal from direct implementation of the WSS projects in the rural areas by 2015, but allow its continued involvement in only technically difficult areas like rural piped-water areas, arsenic-contaminated areas and hard-to-reach areas;
- Ensure that Union WATSAN Committee/Union Parishad approve all WSS development plans implemented in the respective area by the government agencies, the NGOs or the private sector, and coordinate and monitor all WSS-related development works. The Union plans should be checked and appraised at the Upazila level by the Upazila WATSAN Committee/Upazila Parishad;
- Carry out R&D to develop appropriate technologies to address diversified needs;
- Set up a monitoring and coordination mechanism at the community, local government and central levels; and
- Build capacities of sector institutions and communities to protect the environment, adapt to climate change and build resilience for disaster management.

4.3 The New Sector Development Framework

The present Sector Development Framework consisting of the existing acts, policies, strategies and plans is given in a Figure 1.2. The intended Sector Development Framework with the new or amended acts, policies, strategies and plan which are aligned to the SDP is shown in Figure 4.3. The existing ones are also shown for comparison purposes.

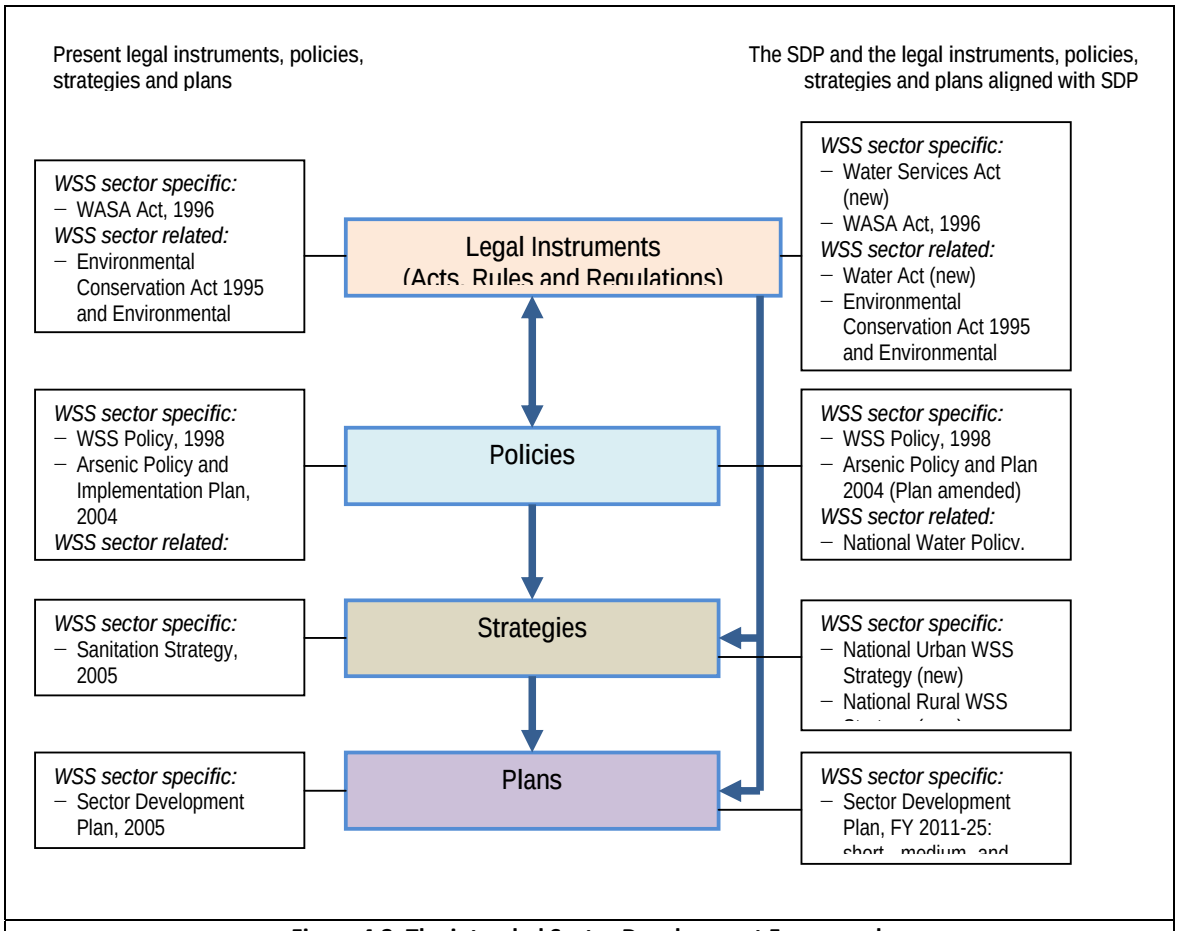


Figure 4.3: The intended Sector Development Framework

Chapter 5

Sector Capacity Building

Capacity building involves interventions at three levels: environmental, organizational and individual. This chapter defines capacity building, explains the three levels of interventions and focuses on capacity building of the LGD and the different agencies under it. The chapter briefly describes the set-up of the different organizations, reports their present and future functions, and presents the actions for building the capacities of the organizations and the individuals. It is expected that other organizations in the sector, such as the NGOs and the private sector, would take initiatives to build their capacities in line with their functions suggested in the SDP.

5.1 Definition and Levels of Capacity Building

According to UNDP (2007), capacity is defined as "the ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner.[57]" Following this definition, three levels of interventions are considered in terms of capacity building at the WSS sector level (Box 5.1):

- Environment;
- Organization; and
- Individual.

The WSS sector interventions required at the environmental level, such as legal and policy frameworks, are elaborated in Chapter 4. Other environment level factors, outside the WSS sector, like economic, social, cultural, political, administrative and legal, are also important for the success of the sector. These should be considered when designing and implementing the capacity building programs. In this group of environment-related factors, good governance plays a critical role. The government is giving priority to improving governance for achieving better development outcomes based on the principles of transparency, accountability, responsiveness, and efficiency. Specifically, according to NSAPR II (FY 2009-11), the government has identified a list of 10 areas where governance improvements are needed: 1) improving the parliamentary process to hold the government accountable on public financial management; 2) strengthening local government; 3) reforming and strengthening public services through civil service reforms; 4) reforming the legal and judicial system, particularly with regard to the poor, women and other vulnerable groups; 5) promoting e-governance; 6) combating corruption; 7) ensuring human rights; 8) accessing information, particularly based on the recent Right to Information Act (2009); 9) improving project implementation capacity; and 10) improving sectoral governance.[58]

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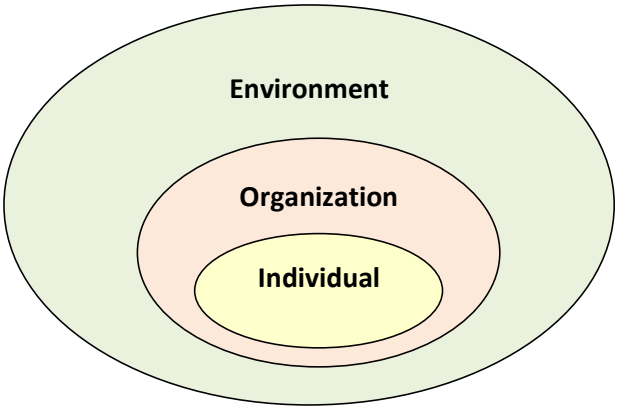
[57] UNDP, May 2007: Capacity Assessment Methodology User's Guide.

[58] Government of the People's Republic of Bangladesh, December 2009: Steps Towards Change: National Strategy for Accelerated Poverty Reduction II (Revised): FY 2009-11 and The World Bank, August 2010: Bangladesh Country Assistance Strategy 2011-2014.

Box 5.1: Levels of capacity building



(adapted from Capacity Building Framework by UNESCO-International Institute for Capacity Building in Africa, 2006)

Levels of Capacity	Definitions of capacity and elements on which capacity is based
Environmental Level	***The environment and conditions necessary for demonstrating capacity at the individual and organizational levels.*** This includes systems and frameworks necessary for the formation/ implementation of policies and strategies beyond an individual organization. There are various dimensions of the environment, such as allocation of tasks to different organizations, administrative, legal, technological, political, economic, social and cultural, that impinge on the effectiveness and sustainability of capacity building efforts.
Organizational Level	***It refers to anything that will influence an organization's performance.*** It includes: human resources (capacities of individuals in the organization); physical resources (for example, facilities, equipment and materials) and capital; intellectual resources, management, process management (for example, problem solving skills, decision-making process and communications.); inter-institutional linkage (for example, network and partnership); incentive and reward systems; organizational culture and leadership.
Individual (or Human Resources Development) **Level**	***The will and ability of an individual to set objectives and achieve them using one's own knowledge and skills.*** Individual capacity building is also referred to as human resources development. It includes knowledge, skills, values, attitude and health, and awareness. It can be developed through various ways such as formal, nonformal and/or informal education, training and on-the-job-training.

The following section analyzes the capacity building of the LGD and the organizations (public and local government) and individuals under it. In the case of other organizations in the sector, such as the NGOs and the private sector, it is expected that they would take initiatives to build their capacities in line with their functions suggested in the SDP.

5.2 Capacity Building of Organizations and Individuals

During the SDP preparation, two broad principles of capacity building were considered: i) emphasizing the ownership by organizations; and ii) recognizing capacity building as a long-term process.[59] Accordingly, exclusive consultations were held with the key sector organizations where, among others, the present and future roles and responsibilities and the capacity building needs were agreed upon (for details, see Agreed Statements of the sector agencies in Annex 6). The following section analyzes capacity building of the LGD and the organizations (public and local government) and individuals under it.

5.2.1 Organizational Structure of the Government Organizations

Overall, the LGD is mandated to provide policy guidance to the sector. It also monitors implementation of policies, plans and development programs by the organizations under it (Figure 5.1).

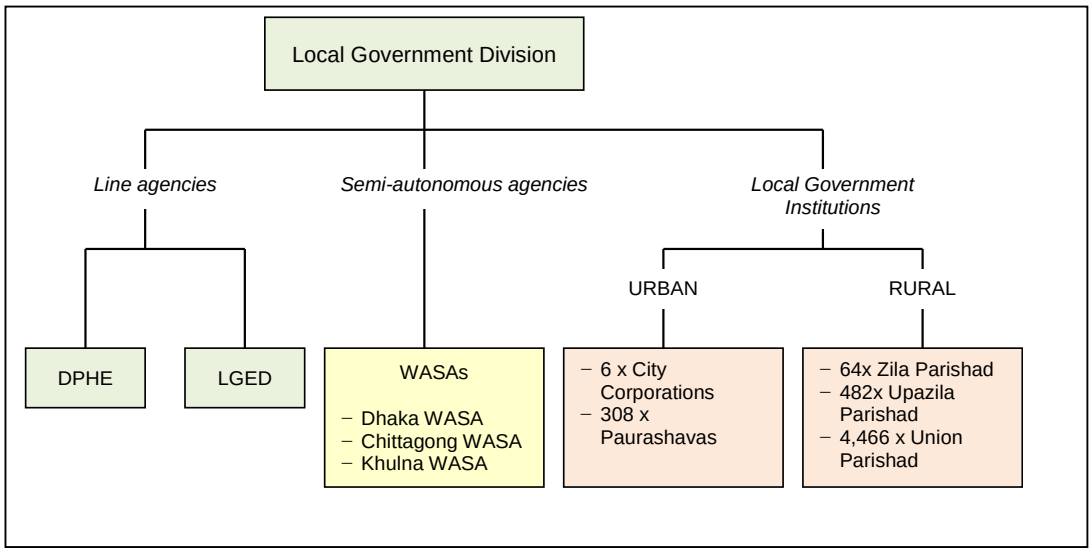


Figure 5.1: Organizational structures of the organizations under LGD

The organizations under the LGD are of three types: i) line agencies consisting of the DPHE and the LGED; ii) semi autonomous organizations, that is, the WASAs; and iii) local government institutions in urban and rural areas. As the national focal agency for water and sanitation, the DPHE is involved in urban and rural areas. The WASAs, urban LGIs (city corporations and paurashavas) and the LGED deal with urban areas. Out of the six city Corporations, Dhaka, Chittagong, Khulna and Rajshahi city corporations do not look after water and sanitation as those cities have WASAs. The rural areas are supported by the rural LGIs (basically upazila parishads and union parishads; presently zila parishads have no substantive role).

[59] UNESCO-International Institute for Capacity Building in Africa, 2006: Capacity Building Framework.

5.2.2 Local Government Division (LGD)

Structure and Functions

The LGD performs a wide range of functions, including policy-making, planning, financial mobilization and allocation. The framing of operational rules, regulations, guidelines and procedures for the agencies and institutions, and their supervision, monitoring and evaluation are also important functions of the LGD. Further, the LGD shares with the Planning Commission the tasks of policy decisions, sector allocation and funding, as well as project appraisals, approval, monitoring and evaluation. It also liaises and negotiates with the DPs through the External Relations Division (ERD) of the Ministry of Finance for mobilizing resources for the WSS sector programs.

The LGD, headed by a Secretary, operates through its four wings, each headed by a Joint Secretary. Different agencies and institutes are placed under the Wings as follows:

- Administration Wing: Administration and audit, and the District Councils (Zila Parishad) and the Upazila and Union Parishads;
- Development Wing: City Corporations, Paurashavas and the LGED;
- Monitoring Evaluation and Inspection Wing; and
- Water Supply Wing: DPHE, and Dhaka, Chittagong, Khulna and Rajshahi WASAs.

The PSU, headed by a Director (Deputy Secretary), is placed under the Water Supply Wing and presently operates in a project mode (with financial support from DANIDA). It was agreed in principle by the LGD that the PSU would be integrated as a permanent unit by 2014. The LGD also implements innovative projects like the HYSAWA project that finances the union parishads for water and sanitation intervention programs out of a dedicated fund which functions under the Bangladesh Companies Act 1994.

The present and the future major functions of the LGD related to WSS are:

Present Functions	Future Function
• Overall guidance to the sector, including formulation of policies and strategies, sector coordination and monitoring; and • Administrative and policy support to the agencies and institutions under it.	• To continue providing overall guidance to the sector with more effective coordination and support to the sector partners, including the NGOs and the private sector; • To continue providing administrative and policy support to the agencies and institutions under it; and • To guide and support a structured development of the WSS sector through implementation of the SDP.

Capacity Building Plan of the LGD

In order to carry out the above functions, the following actions are required:

- Integrate, as agreed, the PSU as a permanent unit in the LGD organogram by 2014;

- Strengthen SDP implementation and monitoring;
- Decentralize administrative and financial authorities, as feasible, to the sector agencies (DPHE, LGED and WASAs) and the LGIs;
- Support restructuring and staffing of the sector agencies, particularly the DPHE, to meet the present and future challenges; and
- Initiate SWAp through rearranging the financing, implementation, reporting and monitoring mechanisms.

5.2.3 Department of Public Health and Engineering (DPHE)

Structure and Functions

According to the NPSWSS, the DPHE is the national focal agency for the water and sanitation sector. It is involved in planning and implementing water and sanitation facilities in the rural and urban areas, except areas under WASAs. The DPHE carries out implementation in collaboration with the city corporations, paurashavas and union parishads.

The DPHE has an outreach of executive engineers at the district level and sub-assistant engineers at the upazila level. It also has four tubewell mechanics in each upazila. According to the new organogram of November 2009, the DPHE has a sanctioned staff position of 7,052, of which 444 are class-I engineers and 652 class-II engineers (sub-assistant engineers). The sanctioned positions include the recently approved (new organogram) 363 new staff including 242 Class-I engineers (assistant engineers). Each assistant engineer would be in charge of two or three upazilas. Although all the new staff members are yet to be appointed, the recent staff expansion would enable the DPHE to strengthen its field strength.

The present and the future major functions of the DPHE are:

Present Functions	Future Function
NATIONAL • Hydro-geological investigation for safe water sources and emergency intervention during natural calamities • To a limited extent, it carries out water quality monitoring and R&D for appropriate WSS technologies	NATIONAL • To continue with hydro-geological investigation and emergency intervention during natural calamities; • To carry out national water quality monitoring and surveillance, including groundwater level, quality monitoring and the Water Safety Plan; • To strengthen the R&D activities and carry out public awareness campaigns; • To implement the WSS projects in technically difficult areas in consultation with the LGIs; • To maintain a national WSS database; and • On behalf of LGD, to advise and monitor the use of surface and ground water.

URBAN • To plan and implement the WSS projects jointly with the LGIs	URBAN • To provide technical assistance to the LGIs to plan and implement projects in WSS and to efficiently operate the systems, including Water Safety Plans; and • To support the LGD/regulator to set service standards and monitor the service level.
RURAL • To implement the WSS projects in consultation with the Union Parishads	RURAL • To implement the WSS projects only in technically difficult areas in consultation with the union parishads; • To provide technical assistance to the union parishads and the upazila parishads in WSS-related functions like formulating and appraising schemes in consultation with the communities; • To support improvement of the quality of services like improved sanitation and the Water Safety Plan' and • To support the private sector and individuals by providing technical assistance in business development and choice of technologies.

As the lead sector agency, the DPHE's organizational strength is a vital factor for the sustainable development of the sector. An analysis of the DPHE organogram of 2009 reveals the need for improvements in the following areas:

- The new structure is more of an expansion of the existing structure, which was gradually built up to support the large rural WSS programs over the last four decades. The new structure does not adequately cater to the staffing and skills required for the present and future challenges for the urban WSS programs (for example, urban utility management);
- The planning and investigation capacity in headquarters has increased with the appointment of the new positions of Additional Chief Engineer, Water Resources, and Superintending Engineer, Feasibility Studies and Design. However, a serious drawback is the omission of the Social Development Division, which would, among others, more effectively cater to the needs of vulnerable groups (Section 3.8) and the R&D Division (Section 3.11).
- Like the previous structure, the new structure is predominantly "Civil Engineer" based, only a limited number of officers from other disciplines (one Senior Social Development Officer, three Social Development Officers and two Assistant Women Development Officers are shown in the Superintending Engineer, Planning Circle) are included. The establishment of multi-disciplinary teams, consisting of positions like economist and hygiene promotion specialist, to address the new challenges, scopes and approaches is missing; and
- The structure and positions for human resource development and water quality analysis need to be further strengthened.

Capacity Building Plan of DPHE and its Staff

In order to carry out the above functions, the following are required:

- To restructure the DPHE organogram to orient it to support the LGIs, particularly the city corporations and the paurashavas. The newly approved relevant staff may be trained in urban water and sanitation, and assigned to the city corporations and the paurashavas;
- To redeploy the existing staff in a phased manner to match with the envisaged strategy. To redefine the charter of duties of field staff involving them more in software activities, for example, the designation and functions of mechanics may be changed to WSS Motivator;
- According to the strategy, to withdraw from directly implementing the WSS projects in rural areas by 2015 but to continue to be involved in technically difficult areas like rural piped water areas, arsenic contaminated areas, water scare areas, and sanitation in flood prone areas till 2020;
- To develop guidelines, systems and procedures to efficiently carry out its functions; and
- To undertake a comprehensive human resource development program to develop its own capacity to carry out the sector works including supporting and building capacities of the LGIs. The new Human Resources Development Circle would be instrumental for this purpose.
- To include the Social Development Division and R & D Division in the new organogram of the DPHE in order to address the emerging issues and challenges in the sector.

5.2.4 WASAs

Structure and Functions

WASAs were first established in Dhaka and Chittagong cities through the then E.P. Ordinance of 1963 to address the WSS needs of large cities. The intention was to operate the organizations under different laws because the public law was considered not to have the flexibility to operate utilities that followed commercial practices. However, the management by the government-appointed staff functioned mostly under the public rules and regulations, and as such the desired commercial efficiency did not materialize. In order to meet the growing needs, the WASA Act was enacted in 1996 to give more autonomy in operations by establishing the WASA Board consisting of members representing different stakeholders. Till now only the top management, that is, the Managing Director and Deputy Managing Directors, is recruited from outside the organizations on commercial terms and conditions. The salaries and the benefits of the staff at other levels are fixed as per the public service salary benefit structure with no incentive packages for better performance. Khulna WASA was established in 2008; the government had declared that it would establish a WASA in Rajshahi in 2010 but it is yet to become functional.

The present and future major functions of the WASAs are:

Present Functions	Future Function
• Operations of the WASAs which need improvements in technical and financial matters	• To provide WSS services in accordance with the quality and service standards set by LGD/Water Supply Regulatory Commission and monitored by the city corporations; • To ensure customer care and services to the disadvantageous communities; • To operate the water supply section (and conservancy section) following sound technical and commercial practices; and • To partner with the private sector and NGOs in some service delivery.

Capacity Building Plan of WASAs

The GoB and some DPs (ADB, DANIDA, Government of Japan, Government of Korea and the World Bank) have already prepared a Partnership Framework with agreed investment plans and action plans including the improvement of the organizational structure, technical improvement and financial management. A policy matrix is prepared with a timeframe to implement and monitor the agreed actions. In this context, it is suggested that the agreed Partnership Framework should be followed.

5.2.5 City Corporations and Paurashavas

Structure and Functions

The WSS services are one of the mandated functions of the city corporations and the paurashavas. Previously, the WSS development projects were solely implemented by the DPHE but, to gradually transfer more responsibilities, the modalities have changed and now projects are jointly implemented. The DPHE implements relatively more sophisticated technical interventions, such as treatment plants, production wells and transmission lines, whereas the city corporations and the paurashavas implement piped networks. The LGED, under some donor-supported urban development projects, also implements the WSS installations as the DPHE does. The O&M is the responsibility of the city corporations and the paurashavas. In the city corporations and the paurashavas, water supply is managed by their Water Supply Sections and sanitation is managed by the Conservancy Sections. Both sections work under the Engineering Department.

The Local Government Acts regarding the City Corporations and the Paurashavas give them the authority to recruit staff and fix water rates (see Section 4.1). However, the authority is not fully exercised due to the need for approval from the LGD or their own reluctance.

The autonomy in the functions of the water sections and their low capacity is the prime concern in effective service delivery and its sustainability (see Section 2.5). The smaller the size, the higher the need for capacity support.

The present and future major functions of the city corporations and the paurashavas are:

Present Functions	Future Function
• To implement the WSS schemes jointly with DPHE • O&M.	• To provide WSS services in accordance with the quality and service standards set by the LGD/Water Supply Regulatory Commission; • To ensure customer care and services to disadvantageous communities; • To operate the water supply section following sound technical and commercial practices; and • To build partnership with the private sector and NGOs in some service delivery.

Capacity Building Plan of City Corporations and Paurashavas

In order to carry out the above functions, the following actions are required:

- To ensure a certain level of independence of operations of the water supply section. This can be done by either establishing an autonomous water section under each city corporation or paurashavas or at least establishing a supervisory board including members from outside to oversee the operations of the water supply section. The performance of this water supply section should be monitored under some form of quality of service agreement;
- To approve regulations (under the Local Government Acts of 2009) for the individual city corporations and paurashavas regarding the staffing of the WSS, and recruit required staff;
- To improve the working procedure and accounting through staff training and development of improved systems and procedures;
- To establish the TLCC and Ward Level Coordination Committee and involve them in planning, implementing and monitoring activities;
- To collaborate with the DPHE and other relevant organizations for technical assistance, and in setting and monitoring water quality and service standards; and
- To make WATSAN committees effective through support in organizing meetings and preparing and monitoring work plans.

5.2.6 Union Parishad

Structure and Functions

In line with its commitment to bring services to the "doorsteps of the people", the government plans to empower and strengthen the local government, particularly the union parishads, and promote decentralization of power through measures, such as (a) building capacity of the local government bodies, and providing adequate fiscal authority and incentives for mobilization of resources at the

local level; (b) introducing planning and budgeting at the ocal level, and ensuring budget implementation; and (c) developing partnerships with NGOs/CBOs at the local level and ensuring their accountability to the local people.[60]

The Union Parishad, the lowest tier of local government, is the only LGI that has been active for a long time in rural areas, while the other tiers or levels have been either abolished or not fully effective or functional. As such, the focus of the local government capacity-building efforts under the various national and DP-funded WSS sector projects is currently on the union parishads.

Some good examples of such initiatives are: a) the HYSAWA Fund, which supports a new approach to decentralized rural WSS services (Box 5.2); b) the BRAC WASH Program, which provides, among others, capacity-building support to the union parishads, village WASH committees and local entrepreneurs; c) the LGD's Horizontal Learning Program (HLP) for Strengthening Capacities of the LGIs on Improving Water Supply and Sanitation Services in Bangladesh, which is a peer-to-peer learning program focusing on the best practice cases and scaling up operations at the union parishad level (Box 5.3); and d) the Social Development Foundation's Social Investment Program Project, which provides, among others, capacity-building support for the union parishads and communities to prioritize needs, manage resources and implement subprojects, including the WSS. In addition to these projects, the LGD's Local Governance Support Project (LGSP) focuses on strengthening the overall capacity of the union parishads in planning, budgeting and public financial management. Further, the National Institute for Local Government (NILG) under the LGD provides capacity-building support for the LGIs for various programs and projects funded by both the donors and the government. In the case of the CHT, which has a different system of local governance, communities are actively engaged in managing the WSS (Box 5.4).

[60] NSAPR-II.

Box 5.2: HYSAWA Fund: a new approach to decentralized rural water supply and sanitation services

The union parishads are the key LGIs in rural WSS, but their leadership and capacity are not fully developed to manage planning and implementation of rural water and sanitation services. The HYSAWA Fund has been established by the GoB in cooperation with DANIDA to support the capacity-building of the LGIs and to support the union parishads and the local communities in improving the coverage of the WSS in rural areas.

The HYSAWA Fund

The HYSAWA Fund is administered by a company registered under the Company Act of 1994. The Fund is governed by a Board with representatives of senior government officials, local authorities, NGOs and civil society. The administration and day-to-day management are carried out by the fund management office headed by a managing director. The HYSAWA Fund works as a basket fund to mobilize funds from the government and the donor agencies. The Fund presently receives financial assistance from the governments of Bangladesh, Denmark and Australia.

The establishment of the HYSAWA Fund as an independent financial institution has been a challenging task. A significant change in the funding procedure and a paradigm shift from "business as usual" to a direct demand-driven approach to planning and implementing projects at the local level are the two challenging tasks being carried out at present.

The Devolution Approach

One vital objective of the devolution approach is to decentralize the decision-making and financial management to the LGIs in regard to hygiene, sanitation and water supply. Direct linkage with the funding source is a key to empowering the LGIs. This linkage, along with the capacity-building inputs, will promote greater devolution of administrative and financial powers to the local government.

Thus, under this approach, a bottom-up planning process is being followed to enable the communities to plan their own projects for hygiene, sanitation and water supply interventions, according to their need and affordability. They submit the community schemes to the respective union parishads for implementation. The HYSAWA company facilitates the establishment of necessary institutional arrangements within the government institutions and engages the private sector management/engineering firms and the NGOs to provide the capacity-building support for the union parishads. The crosscutting issues like human rights, gender, culture and development, and transparency are part of the preparation and mobilization processes and mainstreamed into all stages of implementation and management. Communities are encouraged and supported to take the lead in the entire process right from the beginning to the end of the local project activities.

Outputs

Although the HYSAWA approach has been taken up as a pilot project in the selected areas, its outputs are promising for replication all over the country. By 2010, about 20,000 water points have been installed providing access to safe water with about 1.3 million people which includes a significant portion of the poor and the hardcore poor. The HYSAWA Fund-supported campaign has also motivated over 350,000 households to install sanitary latrines.

The HYSAWA Fund has proven its value in providing direct and effective support for the union parishads. The general experience in giving the union parishads a real role in and responsibility for management and execution of activities is promising. Most of the union parishads are now capable of engaging the service providers (NGOs and contractors) to use the government procurement rules. Hopefully, the approach will establish a model for other development areas in the future.

Source: Prepared for the SDP by Dr. Guna N. Puadyal, Senior Sector Advisor, HYSAWA Project.

Although the role of the upazila parishads regarding development of the WSS sector is still evolving, given the emerging challenges of the WSS sector, particularly the move towards greater decentralization of all development services by the government, it is envisaged that the upazila parishads will have a central role to play in the near future. Regarding the zila parishads, the government intends to review the overall system within a period of three - four years to ensure a reformed and functional structure.

Box 5.3: Horizontal Learning Program (HLP)

The HLP is a peer-to-peer learning initiative led by the Union Parishad, facilitated by the GoB and supported by the DPs. Under this program, the local government institutions connect with one another to identify, share and replicate the good practices of their peers.

HLP Results

In the FY10, the participating union parishads allocated US$1.9 million for the replication of 17 good practices. Of this total, 90 percent was allocated for the replication of WSS good practices (that is, arsenic screening, tubewell protection, 100 percent sanitation and eco-friendly villages).

HLP Principles

1. ***Appreciate:*** To realize our inherent value, strength and potential to overcome the limits that we often unconsciously impose on ourselves.
2. ***Practice:*** To start with those things that are already working and enable learning through exposure to good practices within their local contexts.
3. ***Connect:*** To break down the distinctions that separate us from the essence of our peers and detract from our collective well-being.

HLP Process

- The union parishads are encouraged to identify their good practices (with indicators) that are validated by partner agencies and the union parishads.
- The member union parishads select the good practices they wish to visit and then learn from their peers through appreciative inquiry.
- These union parishads then prioritize, discuss with citizens and integrate these good practices into their annual plans and budgets.
- The union parishads are required to utilize their own resources for replication with the support of their peers through the network.

Source: The World Bank, Dhaka : Water and Sanitation Program.

The provision of WSS services constitutes an important part of the overall mandate of the union parishads, although the local government functions are much wider. However, a union parishad is staffed with only one secretary to serve all purposes. The union parishads receive annual block grants through the upazilas; they also generate a limited amount of revenue by levying taxes and fees, for example, property transfer tax and registration fee, leases of market, water bodies and ferry ghats.

Under the Union Parishad Act 2009, they are required to have 13 standing committees for welfare and development. In order to involve the union parishads in the WSS services under different DPHE

projects, the WATSAN Committee was established in 1994, the Tubewell Site Selection Committee in 1998, and the Union Arsenic Committee in 2000.

Box 5.4: Community-managed piped water scheme in the CHT: A good model for scaling up in other places

The people of Laimipara in the Resa Union of Bandarban Sadar Upazila formed a Para (neighborhood) Committee in 2007 with assistance from World Vision Bangladesh. They mainly belong to the Bom ethnic community. The committee was formed with 12 members of 72 households. The objectives of forming such a committee were to raise funds and undertake social welfare activities, including infrastructure development, education and the WSS. Under this Para Committee, a subcommittee was established for ensuring access to safe and adequate drinking water supply.

The local Karbari (that is, the head of lowest tier –Para/ward level - hierarchy of the CHT Kingship), who is also the Chairperson of the Para Committee, said, "*We prepared a yearly budget for our welfare programs involving all the people of our community based on our collective needs. To mobilize funds for implementation of our programs, every household of the community has decided to subscribe BDT 300 per year. We have already appointed an accountant to maintain the accounts and keep records. There are three very poor households in our community, which are not obliged to pay the yearly subscription, but they will get the benefit of the programs.*"

An initiative was taken to build a piped water supply system in the community to resolve the persistent crisis of drinking water, given that they had only one tubewell or two installed down the hill in the Para. They had to face a lot of hardship while collecting drinking water from the tubewells. The committee leaders talked to the NGO (World Vision) and came to an agreement for the construction of the piped water supply system. Accordingly, construction materials like pipes and fittings and bricks were supplied by the NGO, and the committee installed the pipelines, constructed water reservoirs and chambers as needed. For doing this, the Chairperson added, *"Construction of the water supply system took about two to three months, and one person from every family worked rotationally for three to four days per month."* The source of water is a hilly spring/fountain which is managed to supply though pipeline by gravity flow. Water reservoirs were constructed in several places at tops of the hills from where the water goes to individual households. They also built household latrines for each household with logistic support from World Vision, and are now thinking of gradually providing water supply to the latrines.

The cost of the O&M of the system is fully borne by the community collectively, using funds they have raised. The Chairperson concluded, *"Our water supply has been continuing for the last three years, and now we are quite happy with our facilities and it showed us the way to mobilize all resources required for our social welfare and to keep up our unity as well."*

Date of visit: March 21, 2010 (Edited from Field Notes prepared by Mr. Obaidul Kabir and Md. Jakariya).

Shortage of staff, lack of autonomy, insufficient finance and the absence of proper administrative support structures have caused the union parishads to function as weak institutions. They are close to the rural people and have social and political influence but their potential is not fully developed.

The present and future major functions of the union parishads are:

Present Functions	Future Function
• site selection of tubewells, procurement and distribution of latrine hardware to poor households out of the block grant; and • participation in the sanitation campaign and other motivational works involving the WATSAN committee.	• ensuring WSS services for all in a union; • approving installation of water supply options, including its design and quality; • conducting arsenic testing; • coordinating all WSS projects with technical assistance of DPHE in all areas; and • participating in hygiene promotion, water quality monitoring and surveillance, Water Safety Plan, etc.

Capacity Building Plan of Union Parishads

The capacity development of the union parishads is largely dependent on the decentralization initiatives of the government, such as allocation of financial and technical staff, which has been under consideration for a long time. The level of responsibilities that the union parishads can shoulder will depend on the future structure and authority provided for them. However, the following actions are suggested to facilitate the initiation of their increased roles and responsibilities:

- Formulate village level committees, with support from the NGOs or by their own initiatives, and establish their linkage with the formal committees (for example, WATSAN Committees). Also involve the local influential persons like the teachers and the *imams* (religious leaders) in the WSS sector development process. These committees and the local influential persons would be instrumental in preparing and supporting the local WSS schemes;
- Get the UPs' approval of all WSS investment plans in the unions by government agencies, NGOs or the private sector according to the local participatory master plans. Also coordinate, monitor and issue No Objection Certificates (NOCs) for all WSS development works within their jurisdiction; and
- Improve the working procedure and develop capacities of the UPs and their staff in areas, such as accounting, financial management, procurement and good governance by participating in training programs arranged by DPHE and other organizations.

Chapter 6

Sector Investment Plan

This chapter presents the Sector Investment Plan (SIP), which calculates the investment required for implementing the SDP in the short, medium and long terms, in accordance with the policies and the strategies set therein. For the purpose of investment calculation and presentation, the urban and the rural subsectors are divided into different geographical and hydro-geological planning areas. The factors considered for calculating the costs are provided. Three sector development scenarios – base, moderate and high – are considered and investments needed for each of the scenarios are determined. Summary tables showing the investment requirements for different scenarios and different subsectors are presented. The sources of funding from various sector partners like the public sector (including DPs), WSS utilities, community cost-sharing, private households, private enterprises and NGOs are given. Finally, the public sector investment required in the short term (FY 2011-15) is compared with the possible budget available for the WSS.

6.1 Introduction

SIP determines the investment required to achieve the objectives of the SDP in accordance with the policies and the strategies set therein. Investment requirements are calculated for the short (FY 2011-15), medium (FY 2016-20) and long (FY 2021-25) terms.

6.1.1 Planning Areas

The investment requirements for the urban subsector and the rural subsector are separately determined. Further, in order to reflect the different geographical and hydro-geological characteristics and costs, the subsectors are divided into 19 planning areas as given in Table 6.1. The planning areas for the urban subsector are the same for water supply and sanitation but, for the rural subsector, the planning areas are different for water supply and sanitation.

The details of SIP, including methodology, basic data, assumptions and calculations, are presented in a separate document (Working Document No. 19).

Table 6.1: Planning areas considered for investment planning

Subsectors	Planning areas	
URBAN SUBSECTOR		
Cities with WASAs	***Water Supply and Sanitation***	
	1. Dhaka City	
	2. Chittagong City	
	3. Khulna City	
City Corporations, Paurashavas and Growth Centers	***Water Supply and Sanitation***	
	4. Rajshahi City	
	5. Barisal City	
	6. Sylhet City	
	7. Large Paurashavas	
	8. Small Paurashavas	
	9. CHT Paurashavas	
	10. Other Growth Centers	
	11. CHT Growth Centers	
RURAL SUBSECTOR	***Water Supply***	***Sanitation***
12.	13. Plain Land	18. General area
	14. Coastal zone	19. Hard to reach (sanitation)
	15. Arsenic problem area	20. CHT rural area
	16. Hard to reach (water)	
	17. CHT rural area	

6.2 Factors Considered for Investment Calculation

The following factors were considered while calculating the investment required for different planning areas.

6.2.1 Population Projections

The population projections for the urban and rural areas are shown in Figure 2.2. The urban and rural populations have been further segregated for each of the 20 planning areas. The cost of each area is then calculated.

6.2.2 Technology Options

The choice of technology options considered progressive higher levels of services in the successive terms and possible measures to address issues like the lowering of groundwater levels and climate change. Till now, the sector is dominated by traditional technology options and there is a need for advanced technologies in many areas in the future. For the planning purposes, both traditional and advanced technology options have been considered to reach the service targets set for the three terms. On the basis of water resource analysis, especially for the six metropolitan cities, it is predicted that more surface water will be used in the future. Surface water treatment is, however, expensive and such an effect is considered.

6.2.3 Water Quality Standards

With the gradual improvement in service standards, more stringent water quality standards would be used. For example, the maximum allowable limit of arsenic in drinking water is envisaged to be reduced from 50 ppb to 10 ppb in the future. This has huge cost implications, particularly in terms of the choice of new technologies to replace the existing ones.

6.2.4 Unit Costs

For all cost calculations, the price level in 2010 was considered. Different planning areas are assigned different unit costs considering different material and labor costs. Different unit costs were also considered for different development scenarios (next Section), reflecting the variable conditions.

6.3 Sector Development Scenarios

As a result of implementation of the SDP, the level of development that the WSS sector is expected to achieve would mainly depend on: i) factors internal to the WSS sector like the budget allocated to the WSS sector by the government and other DPs, realization of the sector capacity building programs set in the SDP, and people's participation in the sector development activities; and ii) factors external to the WSS sector including the country's macroeconomic and political stability and the status of governance as well as the impact of the global economic situation. These factors have been considered for the purpose of estimating investment costs based on three scenarios.

Each scenario is described in terms of two parameters: service level, and operating efficiency; the first, indicating the quality of WSS facilities and user convenience, and the second, indicating the level of operating performance of the technology options or the service providers.

- **Scenario 1 (*Base case*)** – which is the present sector condition characterized by low service level and low operating efficiency
- **Scenario 2 (*Moderate*)** – moderate service level and moderate operating efficiency
- **Scenario 3 (*High*)** – high service level and high operating efficiency

6.3.1 Service Level and Operating Efficiency Indicators

The different sets of indicators for urban water supply, urban sanitation, rural water supply and rural sanitation are presented in Tables 6.2, 6.3, 6.4 and 6.5, respectively.

Table 6.2: Service level and operating efficiency indicators for urban water supply

Scenario	Service Level Indicators					Operating Efficiency Indicators		
	Coverage by Piped Water Supply (% of Population)	Supply (hours per day)	Per Capita Consumption (l/day)	Water Quality in Terms of Arsenic (mg As/l)	Water Quality in Terms of Bacteria (Bacteria/ 100 ml)	UfW (%)	Staffing (Staff/1,000 Connection)	Collection Efficiency (%)
Scenario 1 (Base case)	45 – 95	<6	<70	up to 0.05	>10	>35	>13	<75
Scenario 2 (Moderate)	60 – 100	12-24	70- 100	0.05 - 0.01	>0 -10	20-35	10-13	75-95
Scenario 3 (High)	75 – 100	24	>100	<0.01	0	<20	<10	>95

Table 6.3: Service level and operating efficiency indicators for rural water supply (point sources)

Scenario	Service Level Indicators				Operating Efficiency Indicators
	Access to Water Points (People per Water Point)	Water quality in Terms of Arsenic (mg As/l)	Water Quality in Terms of Bacteria (Bacteria/100 ml)	Sanitary Score According to Water Safety Plan	Nonfunctional Water Points (%)
Scenario 1 (Base case)	>100	>0.05	>10	6 – 10	>20%
Scenario 2 (Moderate)	10 – 50	0.05 -0.01	>0 -10	4 – 5	10 - 20%
Scenario 3 (High)	10 – 25	<0.01	0	0 – 3	<10%

Table 6.4: Service level and operating efficiency indicators for urban sanitation

Scenario	Service Level Indicators			Operating Efficiency Indicators	
	Coverage by Technologies Mentioned in the Column in Right (% of Urban Population)	Technology Options Used	O&M Status of Toilet Facilities	Sludge from Onsite Sanitation Safely Managed	O&M Cost Recovery
Scenario 1 (Base case)	50 – 80	Conventional and small bore sewer with treatment and septic tank with safe desludging and disposal up to Paurashava levels	Poorly maintained	Low	Low
Scenario 2 (Moderate)	35 – 95	Conventional and small bore sewer with treatment and septic tank with safe desludging and disposal up to Paurashava levels	Moderately maintained	Medium	Medium
Scenario 3 (High)	20 – 100	Conventional and small bore sewer with treatment and septic tank with safe desludging and disposal up to Paurashava levels	Well maintained	High	High

Table 6.5: Service level and operating efficiency indicators for rural sanitation

Scenario	Service Level Indicators		Operating Efficiency Indicators
	Coverage by Technologies Mentioned in the Column in Right (% of Rural Population)	Technology Options Used	O&M Status of Toilet Facilities
Scenario 1 (Base case)	< 40	Double pit with water sealed latrine and septic tank with safe desludging and disposal	Poorly maintained
Scenario 2 (Moderate)	< 60	Double pit with water sealed latrine and septic tank with safe desludging and disposal	Moderately maintained
Scenario 3 (High)	< 75	Double pit with water sealed latrine and septic tank with safe desludging and disposal	Well maintained

The details of the coverage figures for the key WSS options for the different scenarios and in different terms, with breakdown for each of the planning areas in the urban and rural subsectors, are given in Annex 7.

6.4 Investment Costs

Costs were calculated for the three scenarios and separately for all planning areas. The calculations considered, among others, the different service levels and operating efficiencies in the short, medium and long terms and the factors for investment planning as mentioned above. A progressive increase in the service levels and operating indicators in each of the three SDP terms is considered in accordance with the planning approach of the SDP (see Figure 1.3). The main targets in the three terms are shown in Annex 7. The details of basic data, methodology and calculations are presented in a Working Document (No. 19). A summary of the investment costs for different scenarios and terms is given in Table 6.6.

Table 6.6: Total investment costs at different scenarios

(in BDT million)

Scenarios	Short-term FY 2011-15	Medium-term FY 2016-20	Long-term FY 2021-25	Total FY 2011-25
Scenario 1	270,548	378,474	475,157	1,124,179
Scenario 2	380,410	524,021	561,089	1,465,520
Scenario 3	463,561	636,055	654,838	1,754,454

(in US$ million)

Scenarios	Short-term FY 2011-15	Medium-term FY 2016-20	Long-term FY 2021-25	Total FY 2011-25
Scenario 1	3,865	5,407	6,788	16,060
Scenario 2	5,434	7,486	8,016	20,936
Scenario 3	6,622	9,086	9,355	25,064

The total investment required for Scenario 1 is BDT 1,124,179 million (US$16,060 million) compared to BDT 1,465,520 million (US$20,936 million) and BDT 1,754,454 million (US$25,064 million) in Scenario 2 and Scenario 3, respectively. Figure 6.1 graphically compares the investments required for different terms and scenarios.

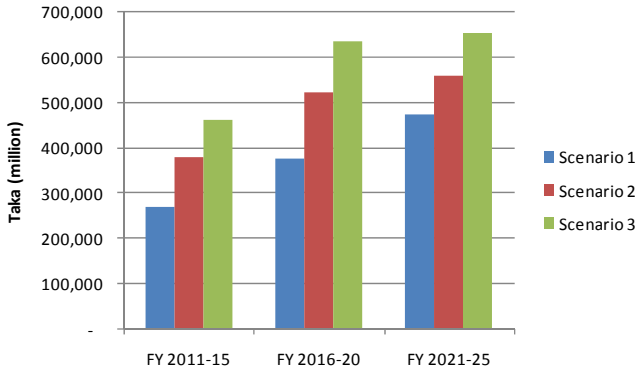


Figure 6.1: Investment costs for different scenarios in short, medium and long terms

Considering the global and country economic trends and the planned development policies and strategies of the government, it is expected that the pace of the WSS sector development would be higher than that in the past trend of development. Scenario 2 (moderate) is considered to be more feasible and thus is considered for further presentation of costs.

6.4.1 Physical Targets

The coverage and service levels would be gradually improved during the three five-year terms of the SDP, detailed targets of the different planning areas for the three terms are shown in Annex 7 and a brief description (Scenario 2) is given below.

In accordance with the government's target, by the short term, 100 percent population would be provided with water supply through either piped water supply and tubewells or other water points. The three WASAs would have 70 - 90 percent piped water supply coverage up from the present 40 - 83 percent coverage. The piped water supply coverage of the city corporations would be 70 - 80 percent up from the present 40 percent, the large paurashavas 70 percent from the present 40 percent, and the small paurashavas 50 percent from the present 30 percent. In rural areas, water supply would still be predominantly tubewell-based, with some increase in piped water systems but, importantly, the access to arsenic mitigation technologies would be ensured. Similar to water supply, 100 percent population would be provided with sanitation facilities ranging from sewerage systems to pit latrines. The sewerage coverage would be increased from the present 35 percent to 50 percent in Dhaka and a sewerage system would be initiated in the second city – Chittagong.

In the medium term, the three cities with WASAs would have 100 percent coverage by piped water supply. The city corporations would also have 100 percent piped water supply coverage, large paurashavas 80 percent and small paurashavas 70 percent. In addition, piped water supply will be introduced in 40 percent urban centers and about 5 - 10 percent of villages would have piped water supply. The sewerage coverage will be increased to 55 percent in Dhaka, 10 percent in Chittagong; and innovative off-site sanitation technologies like small bore sewerage systems with treatment facilities and decentralized sewerage treatment plants would be introduced on a limited scale in Khulna and other City Corporations. Rural areas will see an increase in using advanced sanitation options, about 10 percent use of septic tanks.

In the long term, piped water supply will be further expanded with the large paurashavas having 90 percent, small paurashavas 85 percent, urban centers 40 percent and rural area 10-20 percent coverage. The sewerage coverage would be increased to 60 percent in Dhaka, 30 percent in Chittagong, 25 percent in Khulna and 10 percent in City Corporations. Sewerage systems would be introduced to the large paurashavas covering about 10 percent of the population.

6.4.2 Investment Cost Breakdown

The investment costs required for Scenario 2 for different categories of the urban subsector and rural subsector are given in Table 6.7.

Table 6.7: Investment costs required for different categories of urban and rural subsectors

Categories	Short Term (2010-2015)	Medium Term (2016-2020)	Long Term (2021-2025)	Total
Urban water supply	165,220	280,467	269,257	714,945
Urban sanitation	93,513	107,555	134,823	335,891
Urban drainage	40,485	65,449	74,538	180,472
Rural water supply	44,687	42,824	55,111	142,622
Rural sanitation	36,504	27,726	27,360	91,590
Total	**380,410**	**524,021**	**561,089**	**1,465,520**

The percentage distribution of the total cost for the short term is shown in Figure 6.2. It can be seen that most of the investment (79 percent) would be needed for the urban subsector. The high proportion of investment in the urban subsector may apparently seem like an inequitable distribution of sector resources, but the need for high investment in urban areas represents the comparatively high unit cost of the WSS services, such as piped water supply, sewerage in Dhaka city and urban drainage. Further, poverty and the lack of basic WSS services are more pronounced in the urban areas, especially in the large cities; the slum population is about one-third of the total city population and is growing. Sanitation coverage is only 8.5 percent in the slums (MICS, 2009) and over 35 percent slum dwellers do not have access to safe water supply. The SDP intends to provide water supply and sanitation for all, including the poor, by at least the basic standard. As such, the investment in urban areas would mostly benefit the poor who presently do not have access to these services.

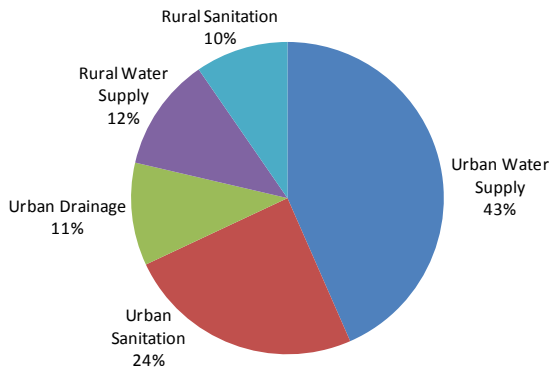


Figure 6.2: Percentage distribution of the total cost for the short-term (FY 2011-15) among different categories

6.5 Sources of Funds

The SDP will be implemented in collaboration with all sector partners. Accordingly, investment cost would also be shared by the WSS sector partners, broadly classified into three groups:

- **Public sector** (including funding by government and the DPs, and revenue generation by the WSS utilities like WASAs and PWSSs);
- **Private sector** (including community contribution in terms of cost sharing, private household investment and private entrepreneurs); and
- **NGOs** (including direct funding from the donors and their own funds).

The sources of funds for the total investment cost, including the O&M costs (Scenario 2), are given in Table 6.8.

Table 6.8: Contribution of sector partners to total investment cost (BDT million)

Sources of Fund	FY 2011-15	FY 2016-20	FY 2021-25	Total FY 2011-25
1. Public Sector:				
Public sector investment	210,456	288,299	232,378	731
Revenue from WSS utilities	88,960	144,466	209,526	442
2. Private Sector:				
Community contribution as cost sharing	2,108	106	70	2,284
Private household investment	69,677	70,193	85,385	225,254
Private entrepreneur	-	14,775	28,468	43,243
3. NGOs	9,209	6,182	5,264	20,655
Total (BDT million)	**380,410**	**524,021**	**561,089**	**1,465,520**
Total (US$ million)	***5,434***	***7,486***	***8,016***	***20,936***

The percentage distribution of the sources of funds for the total investment cost for the short term, which is about BDT 380,500 million, is shown in Figure 6.3. The major investment (55 percent) would come from the public sector and also from the revenues generated by the WSS utilities (23 percent). The contribution of private households (for example, for their own tubewells and latrines) is also significant (18 percent).

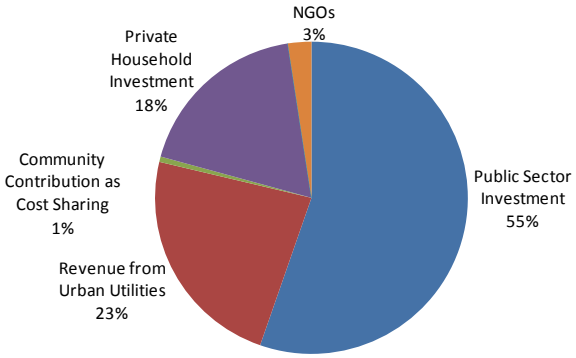


Figure 6.3: Percentages of the sources of funds in the short term (FY 2011-15)

6.5.1 Budget Availability

Budget Allocations during the Last Five Years

The public sector budget allocations to the WSS sector for the last five years have increased steadily. Figure 6.4 shows that out of all national ADP allocations, the allocation to the WSS sector was 2.3 percent in FY 2007 and 5.6 percent in FY 2011, which is more than a two-fold increase. Figure 6.5 shows that, in terms of actual amount it was BDT 6,734 million in FY 2007 and BDT 22,398 in FY 2011, which is again over a three-fold increase in the amount of budget allocation. The donor contribution was about 50 percent of the total ADP allocation to the WSS sector during the same period.

Required and Available Budget

The budget available to the WSS sector during the short term of the SDP, that is, FY 2011-15, is estimated from the allocations made in the MTBF for the first three years (FY 2011-13) and projected by the SDP for the next two years (FY 2014-15) on the basis of a five percent increase in the yearly allocation from the allocation for FY 2013.

The public sector investment to be provided in the ADP during the short term (FY 2011-15) is compared with the budget available to the WSS sector in Table 6.9. The table also provides a breakdown of the investment requirement and budget availability for the urban and rural subsectors and for public sector organizations.

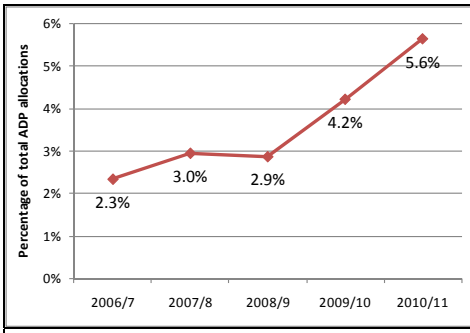


Figure 6.4: Percentage of ADP allocation for FY 2007-11

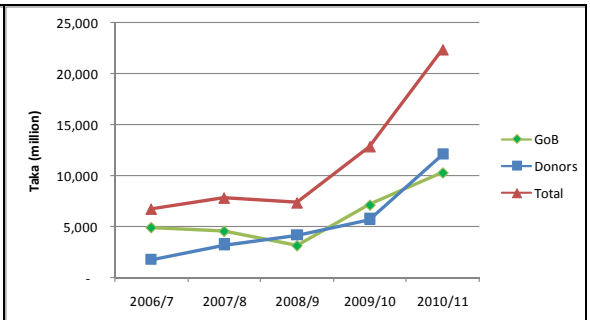


Figure 6.5: Amount of ADP allocation (BDT million) for FY 2007-11

The public sector investment required for the WSS sector in the short term of the SDP is BDT 210,456 million against the total budget availability of BDT 110,528 million, which means a budget gap of 47 percent. The gap is pronounced in the urban subsector, around 50 percent, compared to 23 percent in the rural subsector. The major percentage of budget deficit is in the urban areas, other than WASAs and in such areas where the WSS services are provided mainly by the DPHE and to a smaller extent by the LGED. The budget gap of the DPHE is 76 percent. Khulna WASA has a substantial percentage of the budget gap (70 percent). In terms of actual amount, Dhaka WASA has the highest budget gap of BDT 47,444 million.

Table 6.9: Required investments in the public sector and the available budget during the short-term of SDP

(in BDT million)

Subsectors and Organizations	Required Public Sector Investment	Available Budget (MTBF allocations and projections for WSS	Budget Gaps	Percentage of Budget Gaps
1. Urban subsector:				
WASAs				
Dhaka WASA	97,901	50,456	47,444	48%
Chittagong WASA	30,945	21,109	9,836	32%
Khulna WASA	7,069	2,100	4,968	70%
City Corporations, Paurashavas and others				
DPHE	37,925	8,954	28,971	76%
LGED	12,642	11,280	1,361	11%
2. Rural subsector:				
DPHE	23,975	16,628	7,347	31%
Total (BDT million)	**210,456**	**110,528**	**99,928**	**47%**
Total (US$ million)	***3,007***	***1,579***	***1,428***	***47%***

The trend of the ADP allocations during the last five years (FY 2007-11) and the allocations given in the MTBF for FY 2011-13 to the WSS sector are shown graphically in Figure 6.6. There has been a sharp increase in the budget allocation, especially in the last two years; however, there is no significant increase in the MTBF allocation for FY 2011-13.

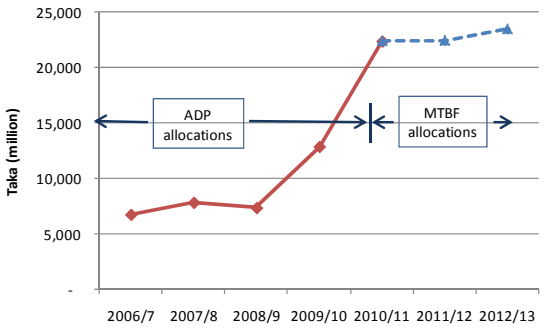


Figure 6.6: ADP allocations for the last five years and MTBF allocations for FY 2011-13

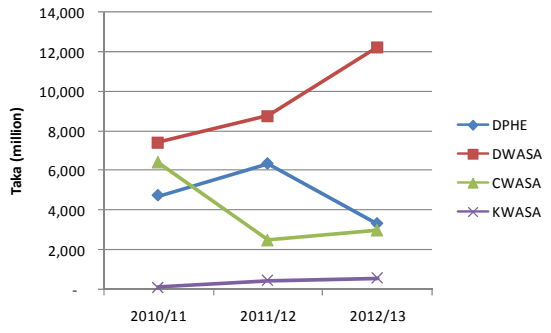


Figure 6.7: MTBF allocations of sector organizations

The MTBF allocations (FY 2011-13) of the different WSS sector organizations are shown in Figure 6.7. The allocation to Dhaka WASA has increased; the allocation to Khulna WASA has increased marginally, but the allocations to the DPHE and Chittagong WASA have decreased substantially. As a net effect, the total MTBF allocations for WSS increased only marginally during FY 2011-13. Based on the two years' (FY 2011-13) allocation trend, the MTBF allocations for FY 2013-15 are projected to remain similar. In order to achieve the SDP objectives in the short term, a two-fold increase in the present level of allocations made in the MTBF is required.

Sector Investment has to increase at least by two folds in the next five years.

The DPs contributed about 50 percent to the total public sector budget for WSS during the last five years (Figure 6.5). It is expected that the same level of financial contribution from the DPs would be available during the short term. Thus, out of the total investment requirement of about US$3,000 million in the short term around US$1,500 is expected from the DPs. An assessment of the possible DP funding for the WSS sector (Annex 8) shows that about US$700 million is allocated or anticipated to be allocated in the short term. The LGD, in consultation with the Planning Commission and the ERD, may seek further DP contributions to the WSS budget.

Chapter 7

SDP Implementation

The institutional arrangements and the modalities of SDP implementation are prepared. Some initial activities, crucial to SDP implementation, are identified. These activities include establishing the acts and a regulatory regime, improving policies and strategies, and setting up a coordination mechanism. A road map for the SDP implementation schedule is prepared. At the end, the risks of SDP implementation and mitigation measures are provided.

7.1 Institutional Arrangement for SDP Implementation

In line with the high importance given by the government to the preparation and implementation of the SDP, the LGD has provided the PSU with the responsibility of facilitating, coordinating and monitoring the SDP implementation. The government will incorporate the PSU, which is now functioning as a project, into the LGD's regular organogram by 2014 to mainstream the policy support functions.

7.2 Stakeholder Participation in SDP Implementation

The SDP is a framework for development and coordination in which a wide range of stakeholders would participate. The structure of stakeholder participation and their respective functions were agreed upon during the SDP preparation process. Several thematic groups were established to provide expert inputs during SDP preparation, and to continue to guide and coordinate the implementation of the respective themes. This process has created a high degree of ownership of SDP among the stakeholders. The existing NFWSS would continue to be the main platform for the stakeholders' participation and, under this Forum, several committees and groups consisting of various stakeholders would function (more is given in next Section).

7.3 Coordination, Monitoring and Evaluation of Sector Development Plan

Development and implementation of a robust coordination, monitoring and evaluation system is crucial to determine whether the sector is on track to achieve its SDP targets. The establishment of an effective sector monitoring and evaluation system will provide many benefits, such as the strengthening of mechanisms for identifying the causes of good or poor performance; service providers more easily held accountable for their performance in a transparent manner; integration of the 'tools' of performance measurement, for example, operational monitoring, financial tracking studies and evaluation; improved information for assessing the effectiveness of policy and for enabling better policy making; and establishment of a more credible system for leveraging more resources for the sector.[61]

[61] Julie Fisher of WEDC: Well Briefing Note 7.1 National sector performance monitoring and evaluation in water and sanitation in Uganda. Briefing Note source material by: Mike Thomson, Patrick A. Okuni and Kevin Samson. WELL, Water, Engineering and Development Centre (WEDC). Loughborough University, UK.

This section firstly reviews the present status of sector-level coordination, monitoring and evaluation arrangements, then highlights the key issues, and finally presents a set of action points.

7.3.1 Present Status of Sector Level Coordination

Broadly, there are two levels: national and local.

National Level

According to NPSWSS 1998, the NFWSS, having representatives from relevant ministries, agencies and the DPs and chaired by the Secretary, LGD, is responsible for coordination, monitoring and evaluation of the sector activities. Since its inception in 2000, the NFWSS has approved, supervised and coordinated a number of policy and strategy documents. It has two sub-committees: Sub-Committee A for policies and strategies, and Sub-Committee B for technical matters. Under these subcommittees, a large number of working groups and thematic groups have been established. Some of these were formed during the revised SDP preparation phase and have made valuable contributions (details in Chapter 2). As envisaged, the thematic groups would also provide technical assistance during the SDP implementation phase.

In addition, there is the National Sanitation Task Force chaired by Secretary, the LGD. It was established in mid 2004 to achieve 100 percent sanitation by 2010. The Task Force has three subcommittees, including a subcommittee for monitoring the action plan to ensure sanitation for all by the revised 2013 deadline. However, due to differences in the definition of sanitation coverage between the JMP report of UNICEF and WHO (the official UN agencies for tracking global achievement of MDGs) and the National Sanitation Secretariat (housed in the DPHE) report, an "Independent Monitoring and Evaluation Committee" with BUET as its convener has been established. It needs to be highlighted here that, according to the National Sanitation Strategy 2005, it is the National Sanitation Secretariat that should determine the monitoring mechanism and parameters to be monitored, and verify the data received from all levels (that is, from ward to city to national).

To address the issue of arsenic, the National Forum formed a subcommittee to review the National Policy for Arsenic Mitigation (NPAM) 2004, and the National Implementation Plan for Arsenic Mitigation (NIPAM) in Bangladesh. In early 2009, this subcommittee became a working group under Sub-Committee B.

Furthermore, under the umbrella of the Local Consultative Group (LCG) in Bangladesh, an association of bilateral and multilateral donors with participation of other stakeholders, including government agencies and the NGOs, the LCG subgroup for water and sanitation shares information and experiences, discusses issues and challenges, coordinates, monitors and harmonizes sector development activities. The LCG WSS subgroup can also create ad hoc working groups as needed.

Local Level

The focal institution is the Union WATSAN Committee chaired by the Union Parishad Chairman. Further, the Chairman chairs a Tubewell Site Selection Committee. Furthermore, on monitoring and

evaluation of the Pro-Poor Strategy for Water and Sanitation Sector in Bangladesh (2005), the ward WATSAN committees are required to submit to the union parishads the minutes of the monthly meetings regarding the current WATSAN situation, in general, and that of the hardcore poor, in particular. For arsenic, the Union Arsenic Mitigation Committee, among others, oversees and coordinates emergency water supply programs in the respective Union.

7.3.2 Issues

The key issues that need to be addressed to ensure better coordination, monitoring and evaluation of the WSS sector activities are highlighted below.

Proliferation of Committees and Groups: While the committees and the groups at the national level have generally made useful contributions to coordination, monitoring and evaluation of sector activities, it seems the WSS sector would stand to benefit if the existing large number of committees and groups could be reduced and rationalized. Concerns have been raised that having such large numbers of committees and groups has often led to "meeting fatigue," given the participation of the same set of officials on many occasions, and created an overlap of functions, thereby resulting in inadequate use of human and financial resources and time.

Inadequate Institutional Capacity of National Agencies and Local* Institutions*: As the focal agency for the WSS sector, the DPHE existing staff generally lacks the capacity to effectively monitor and evaluate sector activities. Specifically, there is a need for considerable improvements at all levels in keeping proper records of data and information, and updating and publishing them on a regular basis. A case in point is the *DPHE Data Book* that was last updated in 2004. The Data Book contained operational information on the paurashavas with performance indicators and is supposed to be published annually. Similarly, there is also a lack of data in the information systems within the paurashavas and city corporations.

At the local level, the union WATSAN committees are also generally weak. According to the NGO Forum for Drinking Water Supply and Sanitation, using 16 performance indicators, an assessment of the capacity of the union parishads, which participated in their programs, showed that 50 percent were capable of leading implementation of WATSAN activities satisfactorily, while 35 percent were partly capable, and the remaining 15 percent were less capable.[62]

Inadequate Sector-wide Information: Firstly, while individual government and nongovernment organizations in the WSS sector have their own coordination, monitoring and evaluation arrangements, these are mostly development project-specific and do not adequately address the WSS sector coverage and performance. Secondly, the use of definitions, terminology and methodology to monitor and evaluate the progress of the key indicators of the sector are often not consistent with the projects implemented by both government and other stakeholders. This inconsistency thus makes a comparison of inter-project performances difficult and provides an inadequate reflection of the sector's overall performance. Thirdly, another related issue that stems from the lack of sector-wide information is the need for effective linking of policies and priorities with financial resource allocations and the impacts of such expenditures on poverty reduction and gender advancement, as required in LGD's MTBF. Finally, the sector's true performance remains clouded due

[62] NGO Forum for Drinking Water Supply and Sanitation, Annual Report 2008, Chapter 3: Monitoring and Evaluation.

to non-inclusion of the major contributions made by individuals in terms of installation of hand-pump tubewells and sanitation facilities.

7.3.3 Action Points for Sector Coordination and Monitoring

To ensure the effective coordination and measurement of the sector's performance, the following measures should be taken up:

- ***Streamline the existing committees and groups at the national level:*** At the national level, there would be only the NFWSS with two committees under it: i) Policy and Monitoring Committee chaired by the Joint Secretary (Water Supply), the LGD, with the PSU acting as the secretariat; and ii) Technical Support Committee chaired by Chief Engineer, the DPHE and comprising members of the existing thematic groups (Figure 7.1).

- The National Forum would be the platform for stakeholders' participation in national events and would also be responsible for sector coordination and monitoring. The Policy and Monitoring Committee would be responsible for policy, strategy and SDP implementation as well as institutional and financial issues. It would also look after coordination with the government agencies, the NGOs and the private sector and the functioning of the Sector Information System (SIS). The Technical Committee would look after technical aspects and the functioning of the thematic groups. All other existing subcommittees and working groups will be decommissioned. The WSS subgroup of the LCG, which is essentially a DP platform, would coordinate with the two committees as and when required.

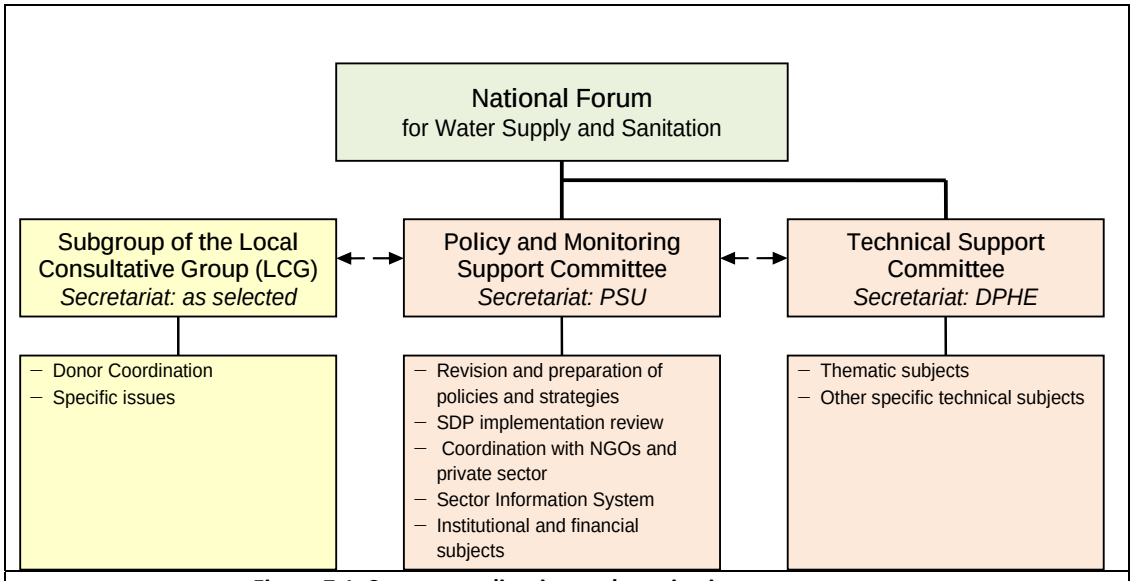


Figure 7.1: Sector coordination and monitoring arrangement

- ***Develop and implement the SIS.*** Firstly, the WSS sector should have a dedicated SIS operated by trained staff having adequate financial and physical resources (Box 7.1).[63] The SIS is essentially a tool for monitoring the progress towards achieving the targets and informing

[63] Ministry of Water and Irrigation, Water Sector Working Group, Final Report, November 2006: Kenya Water Sector Information System. Development of the MWI Information.

government, DPs and the public on sector progress. The indicators to track the sector's performance should be simple, measurable and manageable. Accordingly, it is recommended that the LGD consider using, at the initial stages, eight key sector indicators, which the national and local institutions in the sector are capable of generating, provided adequate capacity-building support and financial and physical resources are provided (Table 7.1).

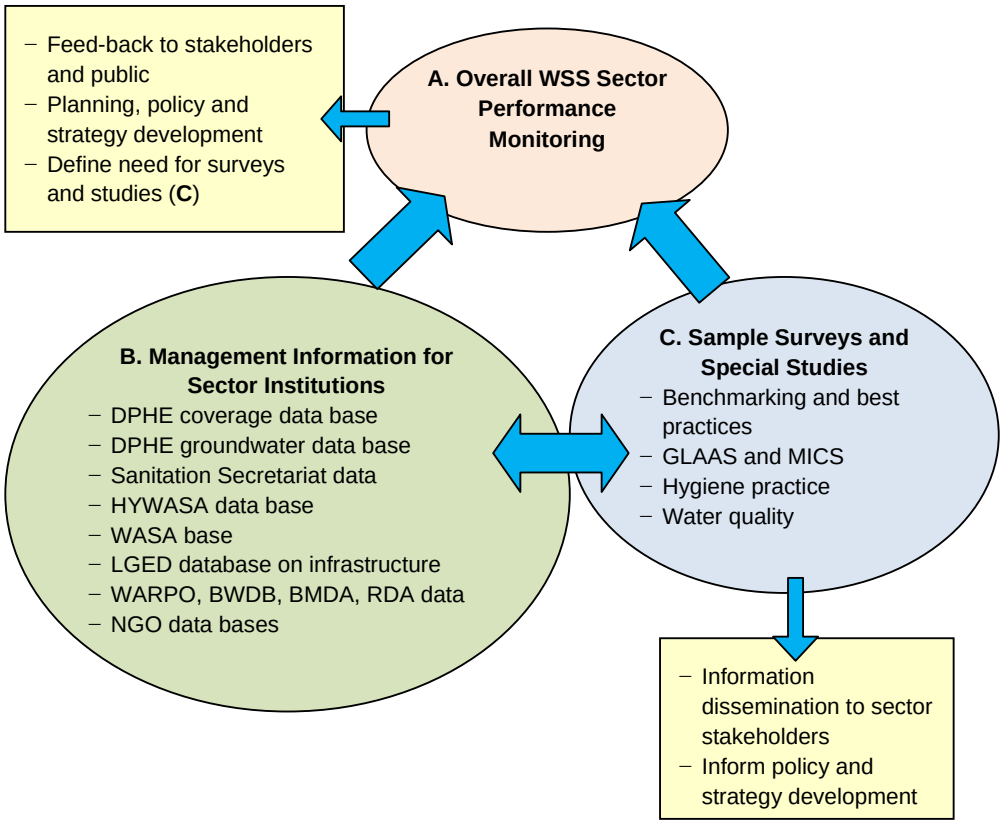
Table 7.1: Key performance indicators for sector information system at the national level

Performance Themes	Key Indicators	Brief Description of the Indicators (unit)
Access	Water supply coverage	Proportion of population with sustainable access to safe drinking water supply (%)
	Sanitation coverage	Proportion of population with access to improved sanitation facilities (%)
Functionality	UfW	Proportion of water delivered to registered customers compared to water produced in water supply systems (%)
	Water quality	Proportion of water sample taken at the point of consumption that complies with the national water quality standards (%)
Organizational Efficiency	Cost recovery	Proportion of capital and O&M costs covered by revenue collection in piped water supply systems (%)
Investment Efficiency	Unit cost	Unit cost of additional population served (BDT/capita)
Inclusiveness	Pro-poor	Proportion of poor population having access to the water and sanitation facilities (%)
Behaviors Change	Hand washing	Proportion of people washing hands with soap or ash after using toilet and before eating (%)

In short, the indicators are: (i) water supply coverage (urban, rural and total); (ii) sanitation coverage (urban, rural and total); (iii) UfW (urban); (iv) water quality (urban, rural and total); (v) cost recovery (urban); (vi) unit cost (urban, rural and total); (vii) pro-poor (urban, rural and total); and (viii) hand washing (urban, rural and total). Finally, given its responsibilities in sector coordination and development, the PSU, with technical assistance, will take the lead role in the development of the SIS.

- ***Establish coordination and monitoring mechanisms at different levels:*** The different coordination and monitoring mechanisms along with their reporting lines are shown in Table 7.2. Each institution, at different levels, would prepare its own monitoring and reporting formats but would also include the relevant indicators out of the eight key indicators. The committees at each level will discuss the outstanding issues, resolve the problems as far as possible by themselves, and report to a higher authority any specific actions required for improved performance. The committees will also provide feedback to the immediate lower level giving the overall status and comments on the actions taken by them.

Box 7.1: A simplified overview of the proposed sector information system



A. **Overall Water Sector Performance Monitoring**: Initially, eight key indicators for monitoring the performance of the WSS sector, for example, coverage of water supply and sanitation (see Table 7.1 for details).

B. **Management Information of Sector Institutions**: Detailed information systems in sector institutions, including NGOs, for monitoring progress related to the mandate of the particular institution, mainly used for progress and performance monitoring. These institutions will include relevant indicators out of the eight key indicators in their monitoring and reporting system.

C. **Sample Surveys and Special Studies**: Availing the results of special studies on sector issues like the Value for Money studies, special in-depth studies on rights issues, gender, water consumption patterns, efficiency in irrigation, and so on. This includes a system for making the research and studies reports available, for example, through links to the PSU's website, for all sector stakeholders to benefit from the documentation.

Note: *The B and C parts of the SIS provide the data needed for A.*

The union parishads, as the lowest tier of the local government, would take the responsibility of collecting information from the respective wards and communities. Where community level or ward level organizations exist, the Union Parishad may collect information through them. The staff limitation at the union parishads is a major concern for effective monitoring and reporting. The union parishads may take the support of ongoing WSS projects in the union or any interested NGO or

individuals for monitoring and reporting. The DPHE, being the lead sector agency, would facilitate the coordination and reporting at the upazila and district levels. For sustainable development, each union parishads should have additional staff, in particular, an accounts assistant and a work assistant.

Table 7.2: Proposed coordination and monitoring mechanisms at different levels

Levels	Coordination and Monitoring Mechanisms	Reporting Lines
Inter-sector	Secretaries' Committee on Water and Sanitation	Reports from time to time to different ministries and national committees
WSS Sector	National Forum for Water and Sanitation National SIS managed by LGD/DPHE	Reports from time to time to Secretaries' Committee, other ministries, national committees and disseminates information among the sector stakeholders
Sector Institution Headquarters (DPHE, WASAs, LGED, WARPO, NGOs, etc.)	Coordination and Monitoring Departments of government organizations and NGOs Databases of the different organizations	Compiles information in the respective databases of the different organizations and sends report to the National SIS in standard formats.
District	District Coordination Committee DPHE Executive Engineer member secretary or focal person for WSS	Compiles, validates and reports to the DPHE Headquarters with copies to the Division The city corporations and the paurashavas (and unions and upazilas) with piped water supply reports to district coordination committees with copies to the DPHE Executive Engineer at the district
Upazila	Upazila WATSAN Committees (or Upazila Development Coordination Committee (UDCC)). DPHE Sub Assistant Engineer (or the Assistant Engineer under the new organogram) member secretary	Compiles and reports to District Coordination Committee with copies to the DPHE Executive Engineer
Union	Union WATSAN Committees	Compiles and reports to upazila parishad with copies to the DPHE Sub-Assistant Engineer The union parishads would collect and compile reports from wards/communities and report to upazila parishad. A focal agency/person such as an NGO, development project or interested individual in the union, if available, may support the union parishads in organzing meetings at different levels and preparing reports
Ward	Ward WATSAN Committees	Ward compiles and reports to the union
Community	Community Development Committees	Uses simple forms and tools and reports to ward (or in certain cases to union directly)

At the headquarters level of different government organizations and the NGOs, the respective organizations would carry out their own coordination and monitoring and would send information in standard formats to the national SIS. At the WSS sector level, the SIS will be managed by the LGD (PSU)/DPHE and report to the NFWSS which is the main body for monitoring and coordination of different organizations including the NGOs. Inter-sectoral coordination would be done by the proposed Secretaries' Committee on Water Supply and Sanitation.

As in the case of the national level, there is a need to streamline different committees at the local level which have similar or overlapping functions. The arsenic committees at the ward, union, upazila and district levels should be merged with the respective WATSAN committees. Similarly, the Tubewell Site Selection Committee at the union level should be merged with the Union WATSAN Committee.

7.4 Sector-Wide Approach (SWAp) in the Water and Sanitation Sector

7.4.1 Introduction

SWAp is a form of program-based approach applied at the sector level (United Nations Population Fund (UNFPA), 2005). It has been widely acknowledged in the development field that individual or discrete projects usually provide fragmented improvements which cannot be sustained after project termination, and draw disproportionately on scarce human capacity and funds (UNFPA, 2004). Further, aid has often been delivered through multiple donors and characterized by fragmented budgetary and management structures, and lacked coherence between existing policies and activities implemented on the ground.[64] Given the GoB's commitment to provide access to safe drinking water and environmental sanitation in a sustainable and equitable manner, which has also been endorsed and supported by the DPs, and recognizing the advantages of a SWAp, the LGD of the MLGRD&C has decided, in principle, to adopt a SWAp for the WSS sector during the implementation of the SDP.

This section first briefly explains the concept of a SWAp followed by an analysis of its advantages over the traditional project approach, then reports the status of SWAps in Bangladesh and lessons learnt, which could be applied in designing a possible SWAp in the WSS sector, and finally analyzes the issues and action points with regards to adoption of a SWAp in the WSS sector.

7.4.2 Concept of a SWAp

To rationalize, simplify and improve aid delivery, a SWAp typically "supports a single sector policy and expenditure program, under government leadership, adopting common approaches across the sector and progressing towards relying on government procedures to disburse and account for all funds"[65] (M. Foster, A. Brown, A. and F. Naschold, 2001). However, it is important to note that SWAp is an approach, not a blueprint, and varies according to country and sector contexts. A SWAp is thus not an end in itself, but is a process-based method of operation and cooperation.

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[64] Michael Wales, Melissa Brown and Alicia Fernandez, FAO, Rome, May 2007: Investment and Resource Mobilization Sector Wide Approaches (SWAps).

[65] M. Foster, A. Brown and F. Naschold, Development Policy Review, 19 (3), 2001: "Sector Programme Approaches: Will They Work in Agriculture?"

In general, the following elements need to be considered in establishing a SWAp in order to enhance the capacity of a sector and improve its performance (Figure 7.2):

a) **Sector Policy and Strategy:** A clear nationally-owned sector policy and strategy, which must be derived from, and be consistent with, the government's overall strategic objectives and strategic framework, including the Poverty Reduction Strategy;

b) **Sector Medium-term Expenditure Framework:** A medium-term expenditure (or budgetary) framework that ensures proposals in the sector action plan has been properly estimated and prioritized against a realistic estimate of available government and external resources;

c) **Funding Arrangements:** Systematic arrangements for programming resources that support the sector thereby linking projects and activities clearly to the assured sources of funds and to detailed work programs based on agreed schedules for implementation;

d) **Performance Monitoring System:** A monitoring system that measures progress and strengthens accountability;

e) **Stakeholder Consultation:** Broad consultation mechanisms that involve all significant stakeholders;

f) **Process for Dialog and Coordination:** A formalized government-led process for aid coordination and dialog at the sector level, making use of national systems of planning, management, implementation, monitoring and evaluation; and

g) **Harmonized Systems**: An agreed-on process for moving towards the harmonized systems for reporting, budgeting, financial management and procurement.

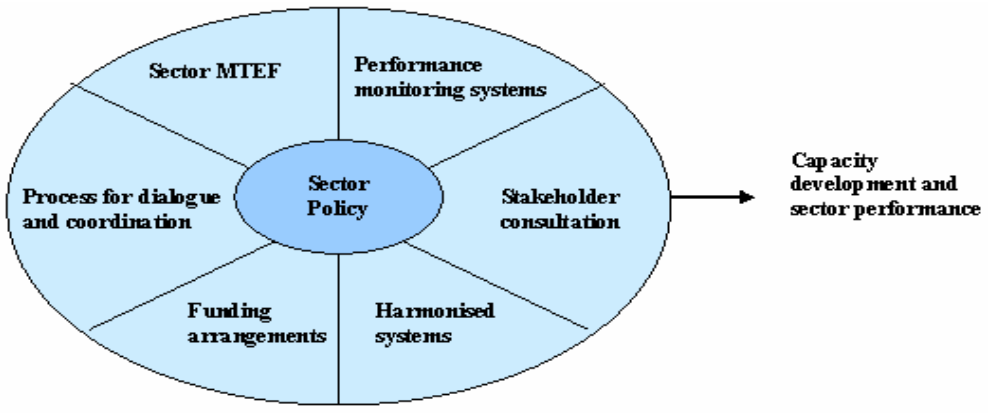

Figure 7.2: Elements of a SWAp
Source: Organisation for Economic Co-operation and Development (OECD), 2006 and FAO, 2007.

In general, providing development support based on a SWAp (sector program) has several advantages over the traditional project approach (Box 7.2).

BOX 7.2: Advantages of SWAp over a project-based approach

SWAp	Project Approach
1. Based on **government ownership** and leadership, and establishes government as the sector leader	1. Can be too donor driven, reflect donor preferences, enjoy little government ownership and, as result, often fail
2. **Results-oriented** (with a focus on sector performance)	2. Have a results focus but targets can be relatively unimportant from an overall sector perspective
3. Promotes a greater **focus on policy -- not on detail**	3. Tend to look at detail and cannot always address broader issues effectively
4. Enables donor support to be **better coordinated**	4. Tends to be little or no coordination between donors, other than perhaps sharing some information on activities
5. Makes **funding** clearer and **more predictable**. When there is a single expenditure plan, all stakeholders can clearly see where their money is going.	5. Standalone projects are not set within an overall expenditure framework. Overall funding flows, therefore, tend to be unclear and can be highly unpredictable
6. **Reduces transaction costs**. DPs and government can agree on joint reviews that are limited and sector-focused	6. Often make significant demands on the time of senior policy makers through numerous project reviews, evaluation and other missions
7. **Improves accountability**. Government sector ministry and agencies are responsible for delivering sector programs	7. Accountability is often to the donor.
8. **Encourages** greater focus on **capacity building** due to greater reliance on local systems.	8. May bypass government systems. Can also drain government of many of its best staff to run project implementation units.
9. Can **increase resource allocation** to under-resourced sectors.	9. Conditions attached to projects rarely relate to sector flows, so they have little influence on the allocation of resources both within and between sectors, and can do little to address any imbalances that exist.
10. **Improves transparency** in budget process. A single expenditure plan allows all stakeholders to assess whether the allocation of resources is consistent with stated national and sector priorities	10. Not the case with projects, so there is little clarity on overall funding flows—nor is it possible to compare overall funding flows with priorities.

Source: UNFPA, 2005.

In the event a SWAp is adopted, the question remains whether the existing projects should be phased out. It is recognized that continued project finance is not necessarily incompatible with the sector program. While SWAps aim to bring the disparate projects together into one integrated program, it does not mean that every single project has to be fully integrated. Integration is a continuum. However, there is a need to ensure that the existing projects do not undermine the sector program. Rather, projects should: (a) demonstrate clearly how the project goals and activities contribute to

sector objectives; (b) explain why project support is preferable to other forms of assistance; (c) break down the costs according to government budget classification, and endeavor to make multi-year commitments where possible; and (d) use government systems where possible (for example, procurement systems and sector review mechanisms) or provide a clear justification when this is not the case[66] (UNFPA, 2005).

7.4.3 Status of SWAps in Bangladesh and Lessons Learnt

To date, there have been two SWAPs in Bangladesh: one in the health sector, and the other in the primary education sector. The two programs present valuable lessons for designing a possible SWAp in the WSS sector (Box 7.3).

Box 7.3: SWAp in Bangladesh

Health Sector
The Health and Population Sector Program (HPSP), the first SWAp in Bangladesh, was implemented during the period of 1998 - 2003. However, an assessment of the completed HPSP pointed out that there were substantial gaps in meeting the health needs of the poor and that progress in improving health indicators under the HPSP was less than optimal. To address the deficiencies of the HPSP and to create a responsive, efficient and equitable health, nutrition and population sector, a new program, called the Health, Nutrition and Population Sector Program (HNPSP), was initiated in 2003 and is expected to be completed by 2010.

The HNPSP is being implemented by a number of departments under the MoHFW, such as the DGHS, Directorate General of Family Planning and Directorate of Nursing Services.

There are three sources of funding for the HNPSP: government revenue, government development, and DP contribution. Two different modalities exist for allocation, disbursement and use of DPs' funds. Pooled funds provided by the DPs, which are based on each DP's financing share of the agreed operational plan, are made available to implementing agencies through government's normal budgetary channels. Non-pooled funds of the DPs are directed towards specific projects or budget lines in the operational plan in accordance with bilateral arrangements between the government and the respective DPs.

Primary Education Sector
The Second Primary Education Development Program (PEDP-II), the first ever SWAp in the education sector, covered the primary education subsector. The PEDP-II was formally launched in September 2004 and is expected to be completed in 2011. A follow-on program is being developed. The Directorate of Primary Education (DPE) under the MoPME is the implementing agency. The PEDP-II is being implemented through the DPE's line divisions unlike the previous project-styled implementation arrangements. Funds for PEDP-II come from four sources: government funds, pooled funds, non-pooled funds and parallel financing for non-pooled international competitive bidding procurement.

Lessons Learnt: While some substantial benefits of SWAps have been evident, several problems have also been encountered. A review of the HNPSP (Health SWAp) indicates that the SWAp approach has: (a) shaped and strengthened government health policy and supported its implementation, technically and financially; (b) rationalized and simplified external health financing, making it more flexible,

[66] UNFPA, the HLSP Institute, UK, September 2005: Sector Wide Approaches: A Resource Document for UNFPA Staff.

aligned and predictable than in the past; and (c) greatly improved working relationships between government and the DPs.[67] On the other hand, questions about the effectiveness of the SWAp in bringing about the much needed organizational and governance reforms in the MoHFW remain. Further, the poor dialog between government and the development partners, weak leadership, and inadequate planning considerably limited the effectiveness of the SWAp.

The review stresses that the problems do not lie in the SWAp model, but in its application. Further, the review emphasizes the need for keeping a constant watch on key SWAp principles, such as: government leadership, a realistic government health plan, commitment to adopt common review, reporting and monitoring systems, and continued efforts to provide external financing in ways that increase absorptive capacity.

In the case of PEDP-II, the concept paper for the third program, prepared by the DPE, listed, among others, the following lessons: (a) better ownership of the program by the DPE as the PEDP-II activities are now perceived as mainstream, as opposed to projects that were considered temporary; (b) increased capacity of the DPE line division staff as the program provides greater opportunity to build capacity and skills; (c) high chance of sustainability compared with the isolated donor-driven projects; (d) holistic approach compared with the previous fragmented activities; (e) increased recognition and importance by both government and the donors, with the government considering the PEDP-II its "flagship" program; and (f) improved discipline and governance in the development activities following the mainstreaming of government procedures (an example of alignment by the DPs).

Another assessment of the PEDP-II by ADB[68] in 2009 concluded that the SWAp is a relevant and effective modality in that it helped reduce the DPs' piecemeal efforts and promoted synergies to achieve many outcomes, particularly increased access and stroke gender balance in enrolment. However, the assessment emphasized that further effort is needed to address the systemic issues related to institutional arrangements and quality.

7.4.4. Issues

Globally, while adoption of a SWAp in the WSS sector is a relatively new development, it has been initiated in a number of developing countries, such as Vietnam, Uganda and Kenya. In the Bangladesh context, several important developments have already taken place in the WSS sector that would smooth out the initial challenges in transition from a project approach to a program approach. These developments, which are essentially key elements of a SWAp, include: (a) existence of national and sector policies and strategies for the WSS sector; (b) demonstrated ownership of adoption of a medium-term budgetary framework for financing activities of the WSS sector; (c) implementation of a system for effective coordination among the DPs, the government ministries and agencies, and other sector stakeholders through the establishment of sector steering committees and a national WSS sector forum; and (d) adoption of a partnership framework between the GoB and the relevant DPs for providing support to Dhaka, Chittagong and Khulna WASAs.

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[67] Javier Martinez, HLSP Institute, UK, February 2008: Sector wide approaches at critical times: the case of Bangladesh. Technical approach paper.

[68] ADB, 2009: Education in Bangladesh: What Worked Well and Why Under the Sector-Wide Approach? Learning Curves, Manila.

Despite such developments, a major challenge with regard to introducing a SWAp in the WSS sector is the inadequate capacity of the ministries and agencies, in particular the LGD and the DPHE, the two major players.

7.4.5 Recommendations on SWAp

Drawing on the lessons of the HNPSP and the PEDP-II, and building on the WSS sector SWAp-related developments that are in place, a number of recommendations regarding development and adoption a SWAp in the WSS sector are presented below:

- **Simple and Small.** A SWAp in the WSS sector should be simple and small at the initial stages. The transition from a project approach to a program approach should be gradual to allow building of capacity and confidence. Accordingly, it is suggested that the LGD adopt SWAps in phases, starting with a sub-SWAp covering the three WASAs given the implementation of activities under the agreed-on partnership framework, and then gradually expanding to small towns, large towns and cities, and rural areas (Figure 7.3). Another arrangement for consideration is to have, in parallel, a separate sub-SWAp for the CHT area in the short term. In the medium term, it is envisaged that a sub-SWAp would be established in the rural subsector, in large cities with WASAs, and in the city corporations and paurashavas;

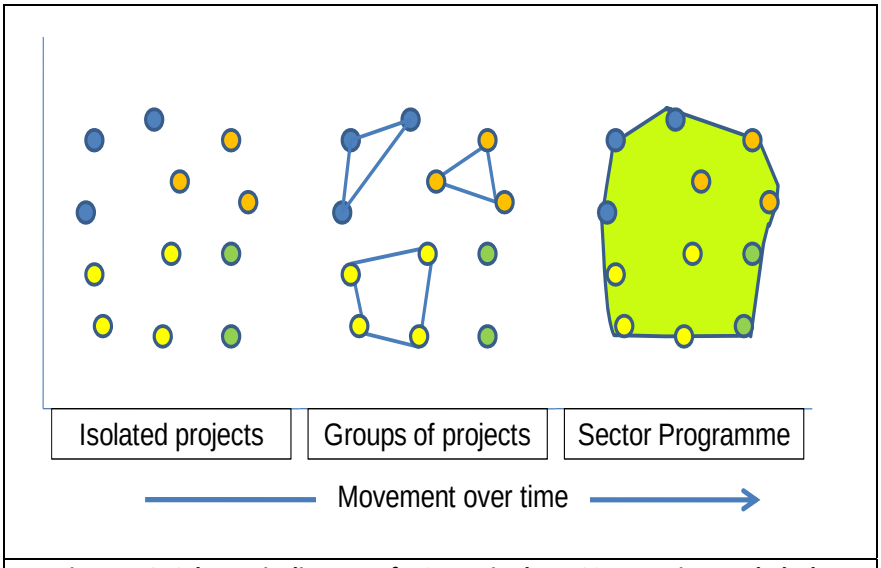

Figure 7.3: Schematic diagram of a SWAp in the WSS sector in Bangladesh

- **Preparatory Works.** It should be recognized that the development of a SWAp will require considerable time, effort, resources and continued commitment. In the case of the PEDP-II, the preparatory phase took almost two years, during which intensive consultations were held with all stakeholders on the program design, management and implementation mechanisms. For the WSS sector SWAp, however, the preparatory works need to focus on: (i) negotiations

with the interested DPs on the nature of the SWAp; (ii) building awareness and providing training on the SWAp concept for the LGD and the related agencies; (iii) strengthening the capacity of staff to prepare and implement a medium-term expenditure framework; (iv) developing fund flow mechanisms; (v) developing monitoring and reporting systems; and (v) agreeing with the DPs on the use of government financial, procurement and reporting procedures and systems, in line with the principles of aid alignment (Paris Declaration); and

- **Lead Agency during Preparatory Phase.** The PSU of the LGD under the MLGD&C should be the lead agency during the preparatory phase and coordinate all preparatory activities in consultation with stakeholders.

7.5 Road Map for SDP Implementation

A road map for SDP implementation is prepared consisting of the key action points identified in the previous chapters. The road map shows the actions points for the sector agencies, that is, the LGD, WASAs, the DPHE and the LGIs. The broad tasks against the action points during the short, medium and long terms are shown along with the SDP monitoring milestones for the short term. The detailed road map is given in Annex 9.

7.5.1 Major Activities during the Initial Period

There are some critical activities during the initial two - three years as given below:

- ***Institutional Arrangement for SDP Implementation:*** The government has already given the role of facilitating SDP implementation to the PSU and funding is secured for some core activities. It is now necessary to strengthen these activities and establish linkages with all sector partners to facilitate their functions under the SDP framework;
- ***Agreement among Sector Partners:*** The key sector agencies including the DPs and the NGOs would enter into agreements to guide their implementation strategies in accordance with the SDP. Key agreements like the Tripartite Agreements among the LGD, the DPHE and the LGIs (city corporation, paurashavas and union parishads) need to be given priority. The outlines of the institutional reforms and SWAp need to be agreed on by the government on the onset of the SDP;
- ***Coordination and Monitoring:*** At the inter-sectoral level, the Secretaries' Committee on Arsenic should be expanded into a Secretaries' Committee on Water Supply and Sanitation which will take actions on inter-sectoral issues. The WSS sector coordination structure should be streamlined by reorganizing the existing committees and groups, and functioning of thematic groups to guide the implementation of the respective themes. The existing NFWSS will coordinate and take relevant actions on all WSS sector issues. SIS needs to be established. There is also a need to initiate a national survey on the status of all WSS facilities and initiate specific studies on issues such as access of the vulnerable groups to the WSS services;
- ***Sector Capacity:*** Capacity building of the key sector agencies like the DPHE is fundamental to the success of the future developments of the sector. Priority attention needs to be given to staff recruitment, organizational restructuring, and staff training;

- ***Revamping Legislations, Policies and Strategies:*** The preparation of new Acts like Water Services Acts, modification of the draft Water Act, and establishing a regulatory framework should be initiated by the LGD. the policies and the strategies should also be streamlined by the LGD with the support of the DPHE;
- ***Alignment of Development Projects:*** All new projects should be prepared under the SDP framework and the ongoing projects should be aligned with it during their DPP revision.
- ***Budget Allocation:*** The LGD, the Planning Commission and other relevant government agencies would seek finance for development projects from the government sources and the DPs. The necessary budget allocation would be reflected in the ADPs, the MTBF and the upcoming Sixth Five-Year Plan.

7.6 Risks and Mitigation Measures

The major risks in implementing the SDP are identified in Table 7.3. The levels of risks are classified in three categories: high, medium and low. The risk levels are considered based on the impact of the risk factor on the WSS sector. Mitigation measures in the SDP are also shown against the risks.

Table 7.3: Risks and mitigation measures

Risks	Level of risks	Mitigation measures
Sector reforms set in the SDP including legal instruments, policies, strategies and plan did not take place.	Low	The Local Government Division had assigned the PSU the responsibility of managing and coordinating the implementation of the SDP. One of its important activities is initiating sector reforms. Moreover, a committee headed by the Joint Secretary (water supply) has been established to monitor the sector reforms. In addition, budget for the PSU's core activities for the coming five years is already allocated. The development partners are showing interest to provide technical and financial support for the SDP implementation.
Capacity building of Local Government Division, agencies under it, particularly the DPHE, and the Local Government Institutions did not materialize.	Medium	The Local Government Division and the different agencies under it, such as the DPHE and WASAs, had signed Agreed Statement on reforms and capacity building. It is expected the agencies under the guidance of Local Government Division would take up capacity building program on a priority basis. Building the capacity of the LGIs depends on the government's policies and political considerations and as such may take some time. However, the SDP has suggested that the government agencies and the NGOs provide support to bridge the capacity gaps.
Budget allocation to the WSS sector by the	Low	Given the government's political

Risks	Level of risks	Mitigation measures
government and the development partners did not increase as expected in the SDP.		commitment to the WSS sector and that there is a sector plan for development (SDP) it is likely the government and the DPs would provide resources to support these initiatives. The SDP has suggested communicating with the Planning Commission, Ministry of Finance, and the DPs through the ERD for additional resource mobilization.
Political support and commitment as enjoyed now by the WSS sector did not continue in future.	Low	Political support is expected to continue and the Local Government Division to keep the political leadership informed of the issues and development.
Natural disasters, on a large scale, affecting the WSS infrastructure, occurred repeatedly.	Low	The SDP has outlined disaster management including preparedness and emergency period protocols which would minimize the effects of the large-scale natural disasters.
Enabling environment as articulated in the PRSP II which includes strengthening local government, improving project implementation capacity, civil services reforms, combating corruption, ensuring human rights, promoting e-governance and improving sectoral governance did not come into effect fully.	Medium	It is expected that with gradual economic development the enabling environment will improve sufficiently.
Global economy remains unstable and major scale economic meltdown happens	Low	Bangladesh is expected to further build up resilience to face global economic crisis, as was demonstrated during the 2008-2009 crisis. The WSS being a basic service would receive priority in case of the crisis.

ANNEXES

ANNEXES

ANNEX 1

List of Working Documents

- Field Consultation on Community Problems and Solutions Related to WSS Services for Sector Development Plan, prepared by the Consultants, July 2009.
- Addendum on Chittagong Hill Tracts prepared by the Consultants, August 2009.
- Sector Wide Approach (SWAp): A Road-map for the Water and Sanitation Sector -- Prospects of SWAp in the Water Supply and Sanitation Sector in Bangladesh, prepared by the Consultants, December 2009.
- Recommendations for Revised Implementation Plan for Arsenic Mitigation by Dr Kazi Matin Ahmed and Peter Ravenscroft, WSP Consultants, 2009.
- Position paper on Arsenic Mitigation on Water Resources by Thematic Group on Arsenic (contribution from Water Resources Planning Organization (WARPO)), 2009.
- Strategies to Address Arsenic Issues in Water Supply by Thematic Group on Arsenic.
- Arsenic Contamination in Irrigation Water, Soil and Food Crops and their Remedial Measures by Thematic Group on Arsenic (contribution from Bangladesh Agricultural Research Institute, BARI), 2009.
- Arsenic Contamination of Drinking Water and Health Hazards Thematic Group on Arsenic (contribution by WHO),
- Groundwater: Quantity and Quality Issues Affecting Water Supply prepared by Peter Ravenscroft, Consultant, WSP; Dr Kazi Matin Ahmed, Consultant, WSP; and M. A. Samad, Groundwater Specialist, Devcon, December 2009.
- Recommendation for a Regulatory Framework for Bangladesh by Antonio R. De Vera, Regulatory Specialist, ADB, November 10, 2009.
- National Hygiene Promotion Strategy by Thematic Group on Hygiene and Sanitation (contribution from UNICEF).
- Contribution to Sector Development Plan of Water Supply And Sanitation: Water, Sanitation and Hygiene in Schools (WASH In Schools) by Thematic Group on Hygiene and Sanitation (by Annemarieke Mooijman, consultant, UNICEF).
- Notes on Disaster Preparedness and Response Management by Thematic Group on Climate Change and Disaster Management (contribution by UNICEF), 2010.
- Grassroots consultation by Thematic Group on Hard to Reach Areas (contribution by the Water Supply and Sanitation Collaborative Council-Bangladesh WSSCC_B).
- Environment: Assessment of and Measures for the Water and Sanitation Sector, by Devcon, November 2009.
- Prospects of PPP in Water Supply and Sanitation Sector in Bangladesh by Devcon, November 2009.
- Climate Change and Adaptation Measures for the Water and Sanitation Sector in Bangladesh by DevCon, November 2009.
- Research Front by ITN-BUET, 2009.
- Calculations of the Sector Investment Plan (SIP) prepared by DevCon, November 2009.
- Water Quality and Water Safety Plan prepared by WHO, November 2009.

ANNEX 2

Thematic Groups and their Members

Sl. no.	Thematic Area	Agencies (focal agency in bold)
1.	Water Supply and Sanitation	**DPHE, UNICEF**
2.	Hygiene	**UNICEF,** Directorate of Health
3.	Environmental Sanitation	**DPHE**, BRAC, WaterAid
4.	Sector Reforms and Institutional Reforms	**PSU**, ABD, World Bank, DPHE, WASA, LGED, DANIDA
5.	Water Safety Plan and Water Quality Monitoring	**WHO**, DPHE, JICA
6.	Arsenic mitigation	**JICA/UNICEF,** DPHE, WHO, WSP, MO Health, MO Agriculture, MO Water Resources
7.	Drinking Water Resource Management	**DPHE**, WASAs, MO Water Resources (WARPO), World Bank, Netherlands
8.	Lagged Behind Areas	**WaterAid**, LGED, NGO-F
9.	Cross-cutting Issues	**WSSC,B**, DPHE, WSP, WAB, NGO–F, DANIDA
10.	R & D	**ITN**, DPHE, WASA
11.	Monitoring and Evaluation	**PSU**, DPHE, WASA, LGED
12.	Disaster Response	**UNICEF,** DPHE, Disaster Management Bureau

ANNEX 3

Members of Peer Reviewer (Not in order of seniority)

Sl.no.	Name
1.	Mr. Ainun Nishat, Vice Chancellor, BRAC University (BRACU)
2.	Mr. Feroze Ahmed, Professor, Civil/Environmental Division, BUET
3.	Mr. Habibur Rahman, Pro Vice Chancellor, BUET
4.	Dr. Md. Mujibur Rahman, Professor, Civil Engineering, Environmental Engineering Division, BUET
5.	Mr. S. M. Ihtishamul Huq, Project Director, GoB-5 Completed, DPHE
6.	Mr. Shamsul Gafur Mahmud, National Professional Officer, Water, Sanitation & Health Environment, WHO
7.	Mr. Hans Spruijt, Chief Water and Environmental Sanitation (WES) Section, UNICEF
8.	Mr. Mark Ellery, Water and Sanitation Specialist, WSP, World Bank
9.	Mr. Rafiqul Islam, Senior Project Implementation Officer, ADB
10.	Dr. Md. Khairul Islam, Country Representative, WaterAid Bangladesh
11.	Mr. S. M. A. Rashid, Executive Director, NGO Forum for DWSS

ANNEX 4

Rural Water Supply Coverage

[NOTE: In the following tables the sequence of determining the rural water supply coverage is given]

Table A-3.1: Number of public water points

Major technologies	Total Water Points (including arsenic and low water table)	Distribution Water Points in Different Categories						
		High Water Table	Low Water Table	Coastal Areas	Arsenic	Hard to Reach	CHT	Total Effective Water Points
Shallow tubewells	867,715	341,094					3610	344,704
DSP tubewells	182,010		175,221				6,789	182,010
Deep tubewells	224,154			162,465	61,689			224,154
SST/VSST	11,385					11,334	51	11,385
Ring wells	20,049				8,304	4,616	7,129	20,049
Rainwater harvesting	830				266	519	45	830
PSFs/IG/Others	4,111				656	3,420	35	4,111
Total	**1,310,254**	**341,094**	**175,221**	**162,465**	**70,915**	**19,889**	**17,659**	**787,243**

Note: Shallow tubewells present in low water tables and arsenic areas not considered distribution of water points.

Source: DPHE Rural Water Supply Status Report, June 2009

Table A-3.2: Coverage based on number of water points

Category	Percentage of Rural Population	Rural Population (million)	Total number of Public Water Points	Estimated NGO Water Points	Estimated Private Water Points	Calculated Gross Coverage* as per Basic Standard	Calculated Gross Coverage* as per Improved Standard
1	2	3	4	5	6	7	8
High water table area	30	32.4	341,094	17,055	2,728,753	153	97
Low water table areas	27	29.16	175,221	8,761	52,566	64	32
Coastal areas	15	16.2	162,465	8,123	48,740	107	54
Arsenic affected areas	19	20.52	70,915	3,546	7,092	36	18
Hard to reach areas	8	8.64	19,889	994	1,989	24	12
Chittagong Hill Tracts	1	1.08	17,659	883	1,766	173	87
Total	**100**	**108**	**787,243**	**39,362**	**2,840,905**		

* Gross coverage are adjusted in Table A- 3.3 below

Note:

Basic standard*:* one public or NGO water points cover 100 persons (community) and one private water point serves 5 persons (a household)

Improved standard: one public or NGO water points cover 50 persons (community) and one private water point serves 5 persons (a household)

Assumptions made:

- The number of NGO water points is 5% of the public water points
- The number of private shallow tubewells in high water table areas is eight times the public ones, private DSP tubewells in low water table areas and deep tubewells in the coastal areas are 30% of the public DSP and deep tubewells, respectively; other private water points in the arsenic affected, hard to reach and CHT are 10% of the public ones

Table A-3.3: Adjustments of coverage figures as shown in column 7 and 8 in Table A- 3.2

Category	Adjusted Coverage in the Category as per Basic Standard	Adjusted Coverage in the Category as per Improved Standard	Remarks on Basic Standard Adjustment	Remarks on Improved Standard Adjustment
High water table area	98	97	2% poor still not covered	same as calculated
Low water table areas	64	32	same as calculated	same as calculated
Coastal areas	95	54	5% poor still not covered	same as calculated
Arsenic affected areas	36	18	same as calculated	same as calculated
Hard to reach areas	24	12	same as calculated	same as calculated
Chittagong Hill Tracts	66	33	considering hilly terrain	considering hilly terrain

Table A-3.4: Adjusted national water supply coverage (in percentage)

Category	Estimated Percentage of Rural Population in Different Categories	Adjusted Coverage in the Category as per Basic Standard	Adjusted Coverage in the Category as per Improved Standard	Estimated National Coverage as per Basic Standard	Estimated National Coverage as per Improved Standard
High water table area	30	98	97	29.4	29.1
Low water table areas	27	64	32	17.3	8.6
Coastal areas	15	95	54	14.3	8.1
Arsenic affected areas	19	36	18	6.8	3.4
Hard-to-Reach areas	8	24	12	1.9	1.0
Chittagong Hill Tracts	1	66	33	0.7	0.3
Total	**100**			**70.4**	**50.6**

ANNEX 5

WHO Guidelines that Differ from Bangladesh Drinking Water Quality Standards

Chemical	Unit	WHO Guideline	Bangladesh Standard	Comment
Aluminum	µg/l	None	200	No WHO-Guideline Value (health). National Health Survey (NHS) records 1.7% of shallow wells and 6% of deep wells >200 µg/l
Ammonia / Ammonium[1]	mg/l	None None	0.5 1.0	No WHO-Guideline Value (health) for either, but WHO notes odor problems at ammonium >1.5 mg/l. Free ammonia is rare in groundwater, but ammonium of >1 mg/l if common in high-iron and high-Ammonia waters
Arsenic	µg/l	10	50	Lower standard likely to be adopted in foreseeable future as high level exposure is eliminated. The change has major implications for the number of wells affected
Barium	µg/l	700	10	Reason for standard unclear, and may warrant raising. Barium is found in the shallow aquifer in the extreme south west, and at various locations in deep groundwater
Boron	mg/l	0.5	1.0	Reason for standard unclear, but WHO-GV changed from 0.3 to 0.5 mg/l in 1999
Calcium	mg/l	None	75	WHO-GV not health-related
Copper	mg/l	2.0	1.0	Reason for standard unclear, but makes little difference
Chloride	mg/l	None	150-600 inland 1,000 coastal	Standards primarily aesthetic, but higher salinities are unacceptable to users. Salinity is a major issue near the coast and in some inland areas
Fluoride	mg/l	1.5	1.0	Reason for standard unclear, but makes little difference. In NHS, almost all wells were <1 mg/l and all were <1.5 mg/l.
Iron	mg/l	None	urban 0.3; rural 1.0	WHO notes 0.3 mg/l for aesthetic reasons. Concentration much higher than 1.0 mg/l are frequently objectionable to users.
Magnesium	mg/l	None	35	WHO-GV not health-related
Manganese	mg/l	0.4	0.1	0.1 mg/l is for aesthetic reasons, 0.4 mg/l for health
Nickel	µg/l	70	100	Reason for standard unclear, but makes little difference to exceedance levels.l
Phosphate/ phosphorous	mg/l	None	6	No health basis for standard (important in surface water), but phosphate/ phosphorous stimulates microbial activity. If anthropogenic, may be associated with pesticides
Potassium	g/l	None	12	WHO-GV not health-related
Sodium	g/l	None	200	WHO-GV not health-related; higher values may be associated with unacceptable salinity
Uranium	µg/l	15	none	Not specified in Bangladesh standards
Zinc	mg/l	3	5	Reason for standard unclear, but makes little difference

[1] The standards actually refer to Kjeldahl-N, which equates to the sum of ammonium and organic-N, but in practice is predominantly ammonium.

ANNEX 6

Agreed Statements

Agreed Statements between LGD and DPHE

Agreed Statements between LGD and three City Corporations

Agreed Statements between LGD and three WASAs

Agreed Statements between LGD and the Municipal Association of Bangladesh (MAB)

Agreement of LGD at Hotel Sheraton

Agreed Statement

on

enhanced roles and responsibilities to face the water supply and sanitation sector challenges

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We, the Local Government Division (LGD) of Ministry of Local Government, Rural Development and Cooperatives (LGRD&C) and the Department of Public Health Engineering (DPHE) participated at the workshop on "Positioning DPHE for Future Challenges" in Cox's Bazar from 6-8 May 2010 (list of participants in Annex 1) and take note that the timing of preparation of the Sector Development Plan for the Water and Sanitation Sector in Bangladesh is appropriate, given the existence of an enabling policy environment, particularly in the form of government's development agenda, as contained in its Vision 2021.

We recognize the urgency to address prevailing and emerging challenges in the sector, such as, climate change, depletion of groundwater resources, total sanitation, arsenic contamination of groundwater, salt water intrusion, rapid urbanization and weak organizational capacities at different levels.

We commit ourselves in trying to achieve the national goal of supplying safe drinking water for entire population by 2011 and bringing each house under hygienic sanitation by 2013 and thereafter continue enhancing the service levels. We affirm that we will accordingly adopt and implement policies, strategies and implementation plans, as will be reflected in the Sector Development Plan.

Having analyzed the sector challenges and the roles of different stakeholders, we agree on the following **principles** of DPHE's engagement in development of the sector (Details in Annex 2):

- Support local government institutions (LGIs), private sector, including individual users, communities, NGOs and others to effectively meet the policy objectives related to safe water supply and total sanitation.
- Extend institutional and technical assistance to Paurashava Water Supply Section (PWSS) and other LGIs to ensure sustained investment and efficient operation and maintenance of water supply and sanitation facilities under agreed framework.
- Forge comprehensive partnership with sector stakeholders, including private sector, for synergy and economies of scale under a common platform.
- Explore the possibility of wider use of surface water sources in water supply.
- Undertake integrated efforts to provide water supply and sanitation services to under served areas and marginalized sections including Chittagong Hill Tracts.
- Cooperate in building appropriate capacities of local government institutions and communities and gradually increase their involvement in implementation, operation and maintenance.

To conform to the above principles we agree to carry out the following **activities:**

- Initiate a consultative process involving LGD, DPHE and LGIs to prepare for a tripartite action plan specifying their roles and responsibilities regarding water supply and sanitation services.
- Scale up R&D activities for developing appropriate water and sanitation technology options (arsenic and other water quality problems, water scarce areas, sanitation in flood prone and high water table areas and urban sanitation), behavioral, social and institutional issues to cope with sector challenges and impact of climate change.
- Restructure DPHE's organization structure in terms of skill mix and number of staff to meet the increased roles and responsibilities including sectoral challenges through placement of required manpower, logistics, and infrastructural support.
- Initiate establishing a regulatory framework in the sector to achieve fairness among stakeholders including customers and ensure compliance with standards.
- Develop national strategies for i) urban water supply and sanitation, ii) rural water supply and sanitation, iii) disaster management in respect of water supply and sanitation and iv) water quality monitoring and surveillance to achieve policy requirements.
- Ensure enhanced budget provision to cater increased coverage and service level to meet the sector challenges.
- Establish a committee headed by the Joint Secretary (Water Supply) having members from LGD and DPHE to monitor the above activities, including addition of new issues.

We hereby pledge our actions and support to implement this agreed statement. Let this statement be circulated to workshop participants and relevant stakeholders.

Monzur Hossain

Secretary
Local Government Division
Ministry of Local Government Rural Development and Cooperatives
Government of Bangladesh

Cox's Bazar

8 May 2010

Agreed Statement

on

Roles and Responsibilities of Rajshahi, Barisal and Sylhet City Corporations to Face the

Water Supply and Sanitation Sector Challenges

We, the participants representing the City Corporations of Rajshahi, Sylhet and Barisal, hereinafter collectively referred to as "Three City Corporations (TCCs)", participated at the workshop on "Future Challenges in Water and Sanitation Sector: Roles of City Corporations" in Chittagong from 27-29 May 2010 (list of participants in Annex 1).

We take note that the timing of preparation of the Sector Development Plan for the Water Supply and Sanitation (WSS) Sector in Bangladesh is appropriate, given the existence of an enabling policy environment, particularly in the form of government's development agenda, as contained in its Vision 2021.

We recognize the urgency to address prevailing and emerging challenges in the sector, such as climate change, depletion of groundwater resources, surface water pollution, saline water intrusion, inadequate urban sanitation, rapid urbanization, low cost recovery and weak technical and financial management capacities of TCCs.

We commit our best efforts to contributing in achieving the national goal of supplying safe drinking water for entire population by 2011 and bringing each house under improved sanitation by 2013, as defined in national documents, and thereafter continue enhancing the service levels. We affirm that we will accordingly adopt and implement policies, strategies and implementation plans, as will be reflected in the Sector Development Plan.

Having analyzed the sector issues, challenges, actions required and the roles of TCCs and other stakeholders, we agree on the following **principles** of TCCs' engagement (details in Annex 2).

- Ensure access to safe water supply and sanitation services to improve health, enhance convenience and upgrade living standards of the city dwellers.
- Use water sources that are technically feasible, economically viable and environmentally sustainable.
- Operate and maintain the water supply and sanitation systems based on sound technical and financial management practices.
- Adopt cost recovery measures for water supply and sanitation services in a manner that will ensure recovery of at least the operation and maintenance costs in the shortest possible time and then gradually recover capital costs and also generate funds for rehabilitation of degraded systems and expansion of facilities to meet future demands.
- Operate water supply and conservancy sections of City Corporations in an efficient, transparent and accountable manner.

- Ensure fairness and social justice among the customers and service providers while establishing service standards and tariff.
- Promote private sector, communities, NGOs and others to effectively meet the policy objectives related to safe water supply and sanitation.
- Ensure satisfactory customer care services
- Provide safety net for the poor and address the needs of women, children and people with disability.

To conform to the above principles we agree to carry out the following **activities:**

- Extend piped water supply coverage to all areas under the jurisdiction of the TCCs by 2020.
- Improve urban sanitation including installation of appropriate sanitation technologies and safe disposal of sludge.
- Reduce unaccounted for water to at least 20% by 2020 by improving technical and management efficiency.
- Install water meters and establish progressive water tariff.
- Build technical and financial management capacities including introduction of double entry accounting system.
- Ensure safety of water from source to the point of consumption by applying Water Safety Plan.
- Establish institutional linkages with DPHE and other concerned agencies for technical and management support related to selection of water sources, development of appropriate water supply and sanitation technology options, addressing water quality problems, depletion of ground water table and other challenges including the impacts of climate change.
- Support the process of designing and establishing the contemplated Water Supply and Sanitation Regulatory Commission.
- Initially consider introducing simple forms of private sector participation like service contracts to gain experience for subsequent wider application.
- Build awareness among customers on improved hygiene practices, safe water handling and use, reduction of wastage of water and regular payment of bills.
- Involve customers more in planning, implementing, operating and maintenance of water supply and sanitation programmes and facilities.
- Establish a committee headed by the Joint Secretary (Water Supply), Local Government Division, having members from LGD, DPHE, LGED and TCCs, to monitor the above activities, including addition of new issues.

We hereby pledge our actions and support to implement this agreed statement, which is subsequently expected to be endorsed by the respective honorable Mayors of TCCs. We also agree to circulate this statement among the workshop participants and relevant stakeholders.

Signed by the representatives of the three City Corporations

Councilor
Mustima Begum Bappy Rajshahi City Corporation

Councilor
MD. ABDUR RAHMAN AZIM Barisal City Corporation

Councilor 29.05.10 Jamal Ahmed Ward No. 16 Sylhet City Corporation

Countersigned:

Monzur Hossain

Secretary
Local Government Division
Ministry of Local Government Rural Development and Cooperatives
Government of Bangladesh

Chittagong

29 May 2010

Agreed Statement

on

Roles and Responsibilities of Dhaka WASA, Chittagong WASA and Khulna WASA to Face the Water Supply and Sanitation Sector Challenges

We, the service providers representing the Dhaka WASA, Chittagong WASA and Khulna WASA, hereinafter referred to as "WASAs", City Corporations of Chittagong and Khulna, and policy support authority representing Local Government Division, and Planning Commission, participated at the workshop on "Future Challenges in Water and Sanitation Sector: Roles of WASAs" in Sylhet from 10-12 June 2010 (list of participants in Annex 1).

We take note that the timing of preparation of the Sector Development Plan for the Water Supply and Sanitation (WSS) Sector in Bangladesh is appropriate, given the existence of an enabling policy environment, particularly in the form of government's development agenda, as contained in its Vision 2021.

We recognize the urgency to address prevailing and emerging challenges in the sector, such as depletion of groundwater resources, surface water pollution, saline water intrusion, and low coverage, lack of appropriate technologies, particularly for urban sanitation, low cost recovery, and inadequate technical and financial management capacities of WASAs. We apprehend that these problems are likely to aggravate due to factors that include, inter alia, rapid urbanization and the effects of climate change.

We commit our best efforts to contribute to the achievement of the national goal of supplying safe drinking water for entire population by 2011 and bringing each house under improved sanitation by 2013, and thereafter continue enhancing the service levels. We affirm that we will accordingly adopt and implement policies, strategies and implementation plans, as will be reflected in the Sector Development Plan (SDP). Further, we reaffirm that we will continue to implement the actions stipulated in the Partnership Framework and the Policy Matrix agreed between the Government and the Development Partners.

Having analyzed the sector issues, challenges, actions required and the roles of WASAs and other stakeholders, we agree on the following **principles** of WASAs' engagement (details in Annex 2).

- Ensure access to safe water supply and sanitation services, including drainage facilities, to improve health, enhance convenience and upgrade living standards of all sections of city dwellers.
- Use water sources that are technically feasible, economically viable, socially beneficial, and environmentally sustainable.
- Operate and maintain the water supply and sanitation systems in an efficient, transparent and accountable manner following commercial practices.
- Adopt cost recovery measures for water supply and sanitation services in a manner that will

ensure recovery of at least the operation and maintenance costs, including rehabilitation of degraded systems, within the shortest possible time, and then gradually recover capital costs of existing and new facilities required to meet future demands.

- Provide a safety net for the poor and address the needs of women, children and people with disability.
- Ensure fairness and social justice among the customers and service providers, while establishing service standards and appropriate tariffs.
- Ensure customer excellence in all services provided.
- Promote private sector, NGOs, communities and others to effectively meet the policy objectives related to safe water supply and sanitation.

To conform to the above principles we agree to carry out the following **activities:**

- Extend piped water supply coverage to all areas under the jurisdiction of WASAs.
- Improve urban sanitation including installation of appropriate sanitation technologies, for households, public places and safe disposal of sludge.
- Upgrade the storm water drainage facilities to improve the living and environmental conditions.
- Install water meters to all connections and establish progressive water tariffs that reflect the true costs of services, as referred to in the above cost recovery principle, while providing safety net measures for the poor in accordance with the pro-poor strategy and the cost sharing strategy, now being revised.
- Build technical and financial management capacities by utilizing skilled personnel, system automation and IT-based operations.
- Take immediate measures to improve the operational and management efficiencies by taking actions including; reducing the unaccounted for water to at least 25% by 2015; identifying and taking actions against illegal connections; upgrading and replacing old and defective pipelines; introducing distribution zone management, including the installation of bulk water meters at sources and zones.
- Ensure safety of water from source to the point of consumption by applying Water Safety Plan as being developed by the Local Government Division.
- Strengthen coordination between the WASAs and the respective City Corporations and other concerned agencies as well as elected representatives at various levels, including city and ward levels, leading to enhancement of participation of stakeholders, avoidance of overlap and creation of synergies.
- Support the process of designing and establishing the contemplated Water Supply and Sanitation Regulatory Commission.
- Consider introducing simple forms of Public Private Partnership (PPP), like outsourcing of services, and management contracts, to gain experience for subsequent wider application.
- Build awareness among customers on improved hygiene practices, safe water handling and use, reduction of wastage of water and regular payment of bills.
- Involve customers more in planning, implementing, operating and maintenance of water supply and sanitation programs and facilities.

- Scale up Research and Development (R&D) activities for developing appropriate water and sanitation technology options, behavioral, social and institutional issues to cope with sector challenges and impact of climate change.
- Create positive corporate image of WASAs by highlighting customer excellence in the provision of services, transparency and accountability in its operations.
- Establish a Committee headed by the Joint Secretary (Water Supply), Local Government Division, having representatives from LGD, Planning Commission, WASAs and City Corporations to monitor the above activities, including addition of new issues.

- We wish to highlight that there are issues which require support from other levels of authority, such as the Local Government Division for full implementation of the WASA Act 1996. This support is required particularly in areas of tariff adjustments and staff recruitment. Further support from the Planning Commission, External Relation Division and Ministry of Finance is needed for the provision of enhanced budgetary allocations and timely approval of projects. The terms and conditions for financing projects to be implemented by WASAs should be similar to those between the government and development partners.

- We need to ensure better coordination among concerned agencies, including Bangladesh Water Development Board, Power Development Board, RAJUK, CDA, and KDA and Department of Environment, for surface and ground water pollution control and improvement of power supply to production tube-wells and water treatment plants. We further need technical interventions for water source protection and development by other agencies. Examples of these interventions may include dam operations and management of Kaptai Lake and the management of rivers, such as, the Karnafuli, Gorai, Buriganga and others in a sustainable and environment friendly manner.

- We hereby pledge our actions and support to implement this agreed statement, which is subsequently expected to be endorsed by the respective Boards of WASAs. We also agree to circulate this statement among the workshop participants and other relevant stakeholders.

Signed by the representatives of WASAs

12/6/10

Engr. Taqsem A. Khan, Managing Director
Dhaka WASA

12/06/2010

Engr. A.K.M. Fazlullah, Chairman
Chittagong WASA

12.6.2010

Engr. Md. Abdullah P.Eng, Managing Director
Khulna WASA

Countersigned:

Monzur Hossain

Secretary
Local Government Division
Ministry of Local Government, Rural
Development and Cooperatives
Government of Bangladesh

Sylhet

12 June 2010

Agreed Statement

on

Roles and Responsibilities of Paurashavas to Face the Water Supply and Sanitation Sector Challenges

We, the Mayors of Paurashavas and members of the Municipal Association of Bangladesh (MAB), representing Paurashavas in the country, hereinafter referred to as "Paurashavas", representatives of Local Government Division, Planning Commission, DPHE and LGED participated at the workshop on "Future Challenges in Water and Sanitation Sector: Roles of Paurashavas" at Jamuna Resort in Tangail from 18-20 June 2010 (list of participants in Annex 1).

We take note that the timing of preparation of the Sector Development Plan (SDP) for the Water Supply and Sanitation (WSS) Sector in Bangladesh is appropriate, given the existence of an enabling policy environment, particularly in the form of government's development agenda, as contained in its **Vision 2021.**

We recognize the urgency to address prevailing and emerging challenges in the sector, such as depletion of groundwater resources, surface water pollution, saline water intrusion, low water supply and sanitation coverage, lack of appropriate technologies, particularly for urban sanitation, low level of cost recovery and inadequate technical and financial management capacities of Paurashavas. We apprehend that these problems are likely to aggravate due to factors that include, inter alia, rapid urbanization and the effects of climate change. We, however, acknowledge that there are examples of good practices like cost recovery and customer care in many Paurashavas, and encourage that these good practices be disseminated to and considered for adoption by other Paurashavas.

We commit our best efforts to contribute to the achievement of the government commitment of supplying safe drinking water for entire population by 2011 and bringing each house under improved sanitation by 2013 and thereafter continue enhancing the service levels.

We affirm that we will accordingly adopt and implement policies, strategies and implementation plans, as will be reflected in the SDP.

Having analyzed the sector issues, challenges, actions required and the roles of Paurashavas and other stakeholders, we agree on the following **principles** of Paurashavas' engagement in WSS activities (details in Annex 2).

- Ensure access to safe water supply and hygienic sanitation services, as well as drainage facilities, to improve health, enhance convenience and upgrade living standards of all sections of city dwellers including the low income communities.
- Use water sources that are technically feasible, environmentally sustainable, economically viable and socially beneficial.
- Operate and maintain the water supply and sanitation systems in an efficient, transparent and accountable manner following commercial practices.

- Aim at improving the service level and adopt cost recovery measures for water supply and sanitation services in a manner that will ensure recovery of at least the operation and maintenance costs, including rehabilitation of degraded systems, within the shortest possible time, and then gradually recover capital costs of existing facilities.
- Take appropriate measures to generate additional income for new facilities required to meet future demands.
- Provide a safety net for the poor.
- Address the needs of women, children, people with disabilities and other vulnerable people.
- Ensure fairness and social justice among the customers and service providers, while establishing service standards and appropriate tariffs.
- Ensure customer satisfaction in WSS services provided.
- Promote and support private sector, NGOs, communities and others to effectively meet the policy objectives related to safe water supply and sanitation.

To conform to the above principles the Paurashavas agree to carry out the following **activities:**

- Extend water supply facilities through piped water supply and other appropriate technologies to all areas under the jurisdiction of Paurashavas in a phased manner.
- Improve overall urban environmental sanitation, including installation of sewerage and other appropriate sanitation technologies, for households, public places and safe disposal of sludge.
- Upgrade the storm water drainage and solid waste management to improve the living and environmental conditions.
- Undertake demarcation, protection and management of water bodies and promote natural and artificial recharge of groundwater with support from relevant agencies.
- Enhance the capacities of the Paurashava Water Supply Section (PWSS) through, among others, staff recruitment and training, establishment of separate accounts for PWSS and introduction of double entry accounting system.
- Initiate a consultative process involving LGD, DPHE and Paurashavas to prepare a tripartite action plan specifying their roles and responsibilities and establish formal institutional linkage with DPHE for ensuring regular technical and management support.
- Develop a WSS database by conducting a baseline survey and regularly update it.
- Prepare WSS Master Plan including land use plan for each Paurashava in cooperation with DPHE and other relevant agencies.
- Install water meters to all connections and gradually establish progressive water tariffs that reflect the true costs of services, as referred to in the above cost recovery principle, while providing safety net measures for the poor/vulnerable groups in accordance with the pro-poor strategy and the cost sharing strategy.
- Build technical and financial management capacities by utilizing skilled personnel and IT-based operations.
- Take measures to improve the operational and management efficiencies by taking actions including reducing the unaccounted for water to below 20%, identifying and taking actions

against illegal connections, leakage and wastage control, introducing distribution zone management, including the installation of bulk water meters at sources and zones.

- Ensure safety of water from source to the point of consumption by applying Water Safety Plan.
- Strengthen coordination between the Paurashavas, DPHE, LGED, other relevant organizations and elected representatives at various levels e.g. through Town Level Coordination Committees (TLCC), Ward Level Coordination Committees (WLCC) and CBOs, leading to enhancement of participation of stakeholders, avoidance of overlap and creation of synergies.
- Support the designing and establishing the contemplated Water Supply and Sanitation Regulatory Commission in due course.
- Introduce simple forms of Public Private Partnership (PPP), like outsourcing of services, and management contracts, to gain experience for subsequent wider application.
- Build awareness among customers on improved hygiene practices, safe water handling and use, reduction of wastage of water and regular payment of bills.
- Involve customers more in planning, implementing, operating and maintenance of water supply and sanitation programs and facilities.
- Support establishing a dedicated "Fund" for development of water and sanitation services, which could be accessed by Poursahavas based on their performance.
- Create a positive image of Paurashavas by highlighting customer excellence in the provision of services, transparency and accountability in its operations.
- Establish a Committee headed by the Joint Secretary (Water Supply), Local Government Division, having representatives from LGD, Planning Commission, DPHE and Paurashavas (through MAB) to monitor the above activities, including addition of new issues.

We wish to highlight that there are issues which require support from other levels of authority, such as the Local Government Division for full implementation of the Paurashava Act 2009. This support is required particularly in areas of tariff adjustments and staff recruitment and formulating rules for demarcation and protection of water bodies.

We also need to ensure better coordination among other concerned agencies, including Ministry of Agriculture, Ministry of Land, Bangladesh Water Development Board, Department of Environment, Power Development Board, Public Works Department, Bangladesh Railway and Urban Development Directorate for surface and ground water pollution control, flood and disaster management, improvement of power supply to production tube-wells and water treatment plants, and better land use.

We want to highlight that in case of disaster-caused damage to any WSS facilities that the incumbent Paurashavas cannot restore on its own, it may seek additional finance from the government for its timely restoration.

We hereby pledge our actions and support to implement this agreed statement. We also agree to circulate this statement among the workshop participants and other relevant stakeholders.

Signed by the President and the Secretary General of the Municipal Association of Bangladesh (MAB) representing the Paurashavas of Bangladesh.

Shamim Al Razi
Shamim Al Razi
Secretary General, MAB
and
Mayor, Singra Paurashava, Natore.

Adv. Md. Azmat Ullah Khan
Advocate Md. Azmat Ullah Khan,
President, MAB
and
Mayor, Tongi Paurashava, Gazipur

Countersigned:

Monzur Hossain
Secretary
Local Government Division
Ministry of Local Government, Rural Development and Cooperatives
Government of Bangladesh

Jamuna Resort
Tangail

20 June 2010

Statement
on
Roles and Responsibilities of Local Government Division to Face the Water Supply and Sanitation Sector Challenges

We, the Officials of the Local Government Division (LGD) participated in a meeting on "Future Challenges in Water Supply and Sanitation Sector: Roles of LGD in Dhaka on 17 July 2010 (list of participants in Annex 1).

We take note that the timing of preparation of the Sector Development Plan (SDP) for the Water Supply and Sanitation (WSS) Sector in Bangladesh is appropriate, given the existence of an enabling policy environment, particularly in the form of government's development agenda as per National Strategy for Acclerated Poverty Reduction, Perspective Plan, Millennium Development Goals (MDGs) and other relevant documents.

We recognize the urgency to address prevailing and emerging challenges in the sector, such as depletion of groundwater resources, surface water pollution, saline water intrusion, low water supply and sanitation coverage, lack of appropriate technologies, particularly for urban sanitation, low level of cost recovery and inadequate technical, institutional and financial management capacities of Sector partners. We apprehend that these problems are likely to aggravate due to factors that include, inter alia, rapid urbanization and the effects of climate change.

We commit our best efforts to contribute to the achievement of the government commitment of supplying safe drinking water for entire population by 2011 and ensuring sanitation facilities by 2013 and thereafter continue enhancing the service levels.

We confirm that we will accordingly adopt policies and strategies and ensure implementation of plans, as will be reflected in the SDP.

Having analyzed the sector issues, challenges and actions required by various Sector stakeholders, LGD endorses the following **principles** of Sector stakeholders' engagement in WSS activities. These principles are the summary of the principles agreed in four workshops with representatives of DPHE (6-8 May 2010), Paurashavas (18-20 June 2010), City Corporations (27-29 May 2010) and WASAs (10-12 June 2010).

- Ensure access to safe water supply and sanitation services, including drainage facilities and solid waste management to improve health, enhance convenience and upgrade living standards of all residents including the low income communities;
- Undertake integrated efforts to provide water supply and sanitation services to under served and hard to reach areas, CHT and to marginalized sections of population.
- Adopt cost recovery measures for piped water supply and sanitation services in a manner that will ensure recovery of at least the operation and maintenance costs in the shortest possible time and then gradually recover capital costs and also generate funds for rehabilitation of degraded systems and expansion of facilities to meet future demands;

- Use water sources that are technically feasible, environmentally sustainable, economically viable and socially beneficial;
- Explore the possibility of wider use of surface water sources in water supply;
- Operate and maintain the water supply and sanitation systems in an efficient, transparent and accountable manner following commercial practices, when applicable, ensuring services to the poor and disadvantaged segments of society;
- Address the special needs of women, children, people with disabilities and other vulnerable groups;
- Ensure fairness and social justice among the customers and service providers, while establishing service standards and appropriate tariffs;
- Ensure customer excellence in all WSS services provided;
- Promote devolution of authority to LGIs;
- Promote and support private sector, NGOs, communities and others to effectively meet the policy objectives related to safe water supply and sanitation.

Additional to these principles DPHE, being the lead agency to support the sector, will have the following specific supportive role:

- Support local government institutions (LGIs), private sector, including individual users, communities, NGOs and others to effectively meet the policy objectives related to safe water supply and sanitation.
- Extend institutional and technical assistance to City Corporations' and Paurashavas' Water Supply Sections and other LGIs to ensure sustained investment and efficient operation and maintenance of water supply and sanitation facilities under agreed framework.
- Cooperate in building appropriate capacities of local government institutions and communities and gradually increase their involvement in implementation, operation and maintenance.
- Strengthen the social development dimensions including hygiene promotion, gender aspects, equity of service and communication on behavior change, i.e. adopting an Information-Education-Communication (IEC) concept.

The agencies of the four workshops agreed to carry out a number of activities in order to conform to the above principles. To be able to carry out these activities the agencies and other stakeholders will need to have an enabling financial, functional and administrative environment, which can only be provided by inter-ministerial cooperation between the Ministries of Finance, Ministry of Planning, Ministry of Establishment and Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives.

To conform to the above principles, the Local Government Division agrees in principle to carry out the following **Tasks:**

- Provide needed sector legislation support including review of existing Acts and preparing new Acts, , such as:
  - The Water Supply and Sewerage Authority Act of 1996;
  - Environment Conservancy Act 1995 (with MoEF);
  - Environmental Conservancy Rules 1997 (with MoEF);

  - Bangladesh Water Act (proposed by MoWR);
  - Water Services Act (to be proposed by LGD);
  - Water Abstraction Regulation (to be proposed by MoWR).
- Issue needed Executive Orders supporting devolution under the provisions of different Local Government Acts;
- Undertake revisions of policies and strategies as per need and preparations of implementation guidelines;
- Introduce sector wide approach (SWAp) initially through sub-sectors, such as WASAs, Paurashavas, City Corporations, CHT and rural areas;
- Create a resource pool (think tank) of sector experts;
- Ensure that all donor aided and GoB funded WSS projects will be formulated and implemented under the approved SDP framework;
- Pursue concerned ministries/divisions to provide adequate budgetary allocations for SDP to be reflected in the MTBF and the 5-Year Plans including the upcoming Sixth 5-Year Plan;
- Create a Dedicated Fund for urban WSS that City Corporations, Paurashavas, Growth Centers, etc. can draw based on their needs and performance;
- Ensure Institutional Strengthening of WASAs (basically covered by the existing Partnership Framework Agreement):
  - Delegate required further authority to WASAs;
  - Strengthen governance and organization structure;
  - Improve financial management capacity;
  - Prepare guidelines for master plan preparation;
  - Ensure sustainable service delivery;
  - Improve customer services relations;
  - Create positive corporate image;
  - Improve transparency and accountability.
- Provide Institutional Strengthening and Capacity Building Support to City Corporations and Paurashavas:
  - Enhance authority of City Corporations and Paurashavas to be able to adjust tariffs and recruit staff for sustenance of WSS services;
  - Enhance capacity of CCWSS and PWSS utilities including maintenance of separate double entry accounting system;
  - Improve financial management capacity;
  - Prepare guidelines for master plan preparation;
  - Ensure sustainable service delivery;
  - Improve customer services relations;
  - Improve transparency and accountability.
- Provide Institutional Strengthening and Capacity Building Support to Districts, Upazillas and Union Parishads:
  - Define the sector role of different administrative levels;
  - Delegate additional authority to LGIs;
  - Prepare guidelines for Infrastructure development;
  - Prepare guidelines for participation of communities, civil society and NGOs;

- Prepare organizational revisions to make additional staff assignment possible when feasible;
- Enhance capacity of LGIs through training arrangements, e.g. through DPHE or NILG.

- Strengthen DPHE:
  - Facilitate restructuring of DPHE to address its new roles and responsibilities;
  - Enhance capacity of DPHE based on a comprehensive HRD Plan;
  - Improve financial management capacity;
  - Prepare tripartite agreement with LGD, DPHE and LGIs on technical support;
  - Ensure technical support to LGIs and other sector stakeholders;
  - Support implementation of Water Safety Plans;
  - Increase capacity of water testing laboratories.
- Ensure appropriate Planning, Monitoring and Sector Coordination:
  - Support establishment of National Management Information System;
  - Support establishment of groundwater mapping;
  - Support City and Paurashava Sector Master Planning;
  - Prepare periodic national surveys to monitor impact of sector improvement initiatives;
  - Streamline and strengthen existing sector forum and committees for coordination;
  - Engage thematic groups for supervision of SDP implementation;
  - Establish a committee headed by the Joint Secretary (Water Supply) having members from LGD, DPHE, WASAs, LGIs and other relevant agencies for monitoring the implementation of SDP.

For better implementation of the above tasks we would ensure better planning and coordination with other concerned ministries and agencies.

We seek cooperation of all concerned stakeholders to implement this statement in order to further develop the water supply and sanitation sector in Bangladesh.

Monzur Hossain
Secretary
Local Government Division
Ministry of Local Government, Ru
Development and Cooperatives
Government of the People's Repul
Bangladesh

Dhaka - 17 July 2010

ANNEX 7

Coverage by Key WSS options in Different Scenarios and in Different Terms

Table A-7.1: Coverage percentage by piped water supply

Selected Planning Areas/ Groups of Planning Areas	Present	Scenario 1			Scenario 2			Scenario 3		
		Short Term	Med Term	Long Term	Short Term	Med Term	Long Term	Short Term	Med Term	Long Term
Dhaka	83	83	90	95	90	100	100	92	100	100
Chittagong	40	50	80	95	80	100	100	85	100	100
Khulna	40	50	80	95	70	100	100	75	100	100
City Corporations	40	50-55	80-85	95	70-80	100	100	75-85	100	100
Large Paurashavas	40	50	60	70	70	80	90	75	85	95
Rural	0	0-0.1	1	5-10	0.5	5-10	10-20	0.5	10-15	15-25

Table A-7.2: Coverage percentage by offsite and onsite sanitation options

Selected Planning Areas/ Groups of Planning Areas		Present	Scenario 1			Scenario 2			Scenario 3		
			Short Term	Med Term	Long Term	Short Term	Med Term	Long Term	Short Term	Med Term	Long Term
Dhaka	Offsite	35	40	45	50	50	55	60	55	65	70
	Onsite	45	60	55	50	50	45	40	45	35	30
Chittagong	Offsite	0	0	10	20	5	20	30	10	25	40
	Onsite	90	100	90	80	95	80	70	90	75	60
Khulna	Offsite	0	0	5	15	0	15	25	5	20	35
	Onsite	90	100	95	85	100	85	75	95	80	65
City Corporations	Offsite	0	0	0	5	0	5	10	5	10	15-20
	Onsite	90	100	100	95	100	95	90	95	90	85-80
Large Paurashavas	Offsite	0	0	0	5	0	5	10	0	10	15
	Onsite	80	100	100	95	100	95	90	100	90	85
Rural	Offsite	0	0	0	0	0	0	0	0	0	0
	Onsite	90	100	100	100	100	100	100	100	100	100

Table A-7.3: Coverage percentage by urban drainage

Selected planning areas/ groups of planning areas	Present	Scenario 1			Scenario 2			Scenario 3		
		Short Term	Med Term	Long Term	Short Term	Med Term	Long Term	Short Term	Med Term	Long Term
Dhaka	35	60	80	90	60	80	90	70	90	100
Chittagong	30	60	80	90	60	80	90	70	90	100
Khulna	30	60	80	90	60	80	90	70	90	100
City Corporations	30	60	80	90	60	80	90	70	90	100
Large Paurashavas	25	50	75	90	50	75	90	60	90	100

ANNEX 8

Potential New Donor Funding for Investment Projects

Donor Agencies	Indicative Amount (US$ million)	Financing Period	Remarks
World Bank	230	2011 to 2016	The Chittagong Water Supply Improvement and Sanitation Project (estimate US$130 m) is in pipeline. Second phase of DPHE's water supply project another US$100 m is expected
Asian Development Bank	200	2012 to 2017	May provide funds for City Corporations and large Paurashavas (about US$100 m) and to Khulna WASA (about US$100 m)
DANIDA	30	2012 to 2017	Expected to provide DKK 200 m (approx. US$30 m) for its Phase III Program. This will be used mainly for HYSAWA Fund (rural water and sanitation)
JICA	150	2011 to 2016	A project for Arsenic Mitigation in South-west districts in the process of approval by the Planning Commission. JICA may also provide additional funds to the sector including about US$100 m for Khulna WASA.
UNICEF	75	2012 to 2017	After the end of its current program in 2012 UNICEF will continue with at least US&10-20 m per year out of its core funds
AusAID	15	2011 to 2016	There is a good possibility that AusAID will come into the WSS sector with an amount of US$1-2 m per year for 2 years (possibly co-finance HYSAWA Fund) and then the amount may increase to about US$4-5 m per year
Total (US$ million)	700		

ANNEX 9

Road Map for SDP Implementation

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	Medium Term (2015-20)	Long Term (2020-25)
LEAD RESPOBSIBILITRY: LGD (supported by PSU)					
ACTS					
Local Government Acts of 2009 for City Corporation, Paurashavas, Upazila Parishads and Union Parishads	LGD to delegate more administrative and financial powers to LGIs LGD to delegate authority to City Corporations and Paurashavas to: i) recruit staff, ii) fix water tariff, and iii) demarcate, protect and maintain water bodies by issuing executive orders or approval of Regulations formulated by Paurashavas and City Corporations	DPHE / LGIs	Government Order on staff recruitment issued by 2012. Regulations reviewed and approved by 2012		
WASA Act, 1996	LGD to delegate authority to increase water tariff from 5% to 10% (ref. section 22 sub-section 2 of WASA Act)	WASAs	Government order issued by 2011	Reviewed and updated	Reviewed and updated
Environmental Conservancy Act, 1995 and the Environmental Conservation Rules, 1997 (MoEF)	LGD to initiate amendment to the Environment Conservation Rules of 1997 to: i) revise drinking water standards, ii) include more detailed surface water standards, iii) revise point source discharge standards and iv) include sewerage treatment plants in the industrial emission standards	MoE&F	Amendment proposal sent by LGD to MoEF by 2012 Amendment initiated by MoEF and finalized by GoB by 2013		

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	**Medium Term (2015-20)**	**Long Term (2020-25)**
Bangladesh Water Act 2008 (Draft prepared by MoWR)	LGD to send proposal to incorporate specific measures for groundwater management: i) define water stressed areas to include groundwater quantity and quality issues, ii) Issuing licenses for well drilling, abstraction, etc.	MoWR	Proposal sent by LGD to MoWR by 2012 To be completed by 2013		
	In parallel, LGD will assist MoWR in preparing a National Groundwater Strategy.	DPHE / WARPO	Draft strategy submitted by DPHE to LGD by 2011 Strategy approved by MoRW by 2012		
Bangladesh Water Services Act	LGD to draft and initiate enactment of the Act that will, among others, establish Water Supply Regulatory Commission	WASAs DPHE	Draft Act sent to Cabinet Division by LGD by 2012 Act enacted by 2013		
	Water Supply Regulatory Commission to be established in two phases: i) Water Cell (WC); and ii) Water Supply Regulatory Commission (WRC)		Proposal for WC and WRC sent to Cabinet Division by LGD by 2012 Water Cell established by 2012	WRC established by 2017 covering WASAs and City Corporations	WRC established covering the WSS sector by 2025

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	Medium Term (2015-20)	Long Term (2020-25)
POLICIES					
National Policy for Safe Water Supply and Sanitation 1998	No immediate revision required	DPHE	Present policy used	Reviewed and revised, if required	Reviewed and revised, if required
National Policy for Arsenic Mitigation and Implementation Plan 1994	Separate the joint Implementation Plan (IP) for Arsenic Policy (AP) and prepare sector-wise Implementation Plans for Water Supply (by LGD), Health (by MoH&FW), Agriculture (MoA) and Water Resources (MoWR)	DPHE	Separation proposal sent by LGD to Secretaries' Committee/ Cabinet Division by 2011 IP separated by 2011		
	LGD to prepare the Implementation Plan for Water Supply (IP-WS)	DPHE	Draft IP-WS send to Secretaries' Committee/ Cabinet Division by 2011 IP-WS approved by 2012		
STRATEGIES					
National Urban Water Supply and Sanitation Strategy National Rural Water Supply and Sanitation Strategy	Review existing strategies and those under preparation and consolidate them into the two strategies: urban and rural	DPHE	Draft strategies prepared by LGD by 2012 Strategies approved by LGD by 2012	Reviewed and updated, if necessary	Reviewed and updated, if necessary

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	Medium Term (2015-20)	Long Term (2020-25)
INSTITUTIONAL STRENGTHENING					
LGD capacity strengthening	Integrate PSU as a permanent unit in the LGD organogram		Proposal sent by LGD to Cabinet Division by 2012 PSU set-up transferred to revenue head by 2014		
	Prepare Tripartite Agreement between LGD, DPHE and LGIs specifying their roles and responsibilities regarding WSS services. DPHE to initiate the process and LGD to issue executive orders	DPHE	Proposal sent by DPHE to LGD by 2011 Executive Order issued by LGD by 2011	Reviewed and updated, if necessary	Reviewed and updated, if necessary
COORDINATION AND MONITORING					
Streamline existing committees and groups	At the national level will have NFWSS and under it (i) Policy and Monitoring Support Committee; and (ii) Technical Support Committee	PSU	Proposal sent y PSU by 2011 Committees restructured by 2011	Reviewed and updated, if necessary	Reviewed and updated, if necessary
	At local levels, integrate the functions of Union Tubewell Site Selection Committee and Union Arsenic Mitigation Committee into the Union WATSAN Committee. Similarly integrate the functions of Arsenic Mitigation Committees into the different WATSAN Committees at Upazila and District levels	DPHE	Proposal sent by DPHE to LGD by 2011 Local level committees streamlined by 2012	Reviewed and updated, if necessary	Reviewed and updated, if necessary

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	**Medium Term (2015-20)**	**Long Term (2020-25)**
SIS	Establish dedicated SIS for the WSS sector	DPHE WASAs, LGIs, NGO, Private Sector	Key monitoring Indicators agreed by stakeholders by 2011 National survey done by 2012 SIS established by 2013	Reviewed and updated, if necessary	Reviewed and updated, if necessary
SECTOR WIDE APPROACH (SWAp)					
SWAp	Develop simple and small SWAps and gradually expand to cover the full WSS sector	PSU/ DPs/ DPHE/ WASAs/ CCs/ LGIs/ Ministry of Finance/ Planning Commission	Negotiations with DPs completed by 2012 Fund flow and monitoring mechanisms established by 2013, in line with the principles of aid alignment (Paris Declaration)	Sub-SWAps implemented in i) Cities with WASAs, ii) City Corporations and Paurashavas, iii) Rural, and iv) CHT	SWAp established at WSS sector level
THEMATC AREAS					
Research and Development (R&D)	Create a dedicated "R&D Fund" to increase funding and create opportunities for interested researchers.	PSU	Proposal prepared by PSU by 2011 Agreement reached by sector stakeholders by 2012 R&D Fund established by 2012	Reviewed and updated	Reviewed and updated

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	**Medium Term (2015-20)**	**Long Term (2020-25)**
Climate Change, Environment and Disaster Management	Operationalize Disaster Management Bureau's Standing Order for WSS sector agencies by issuing a supplementary Standing Order that would consist of, among others, roles and responsibilities, delegation of enhanced administrative and financial powers to enable emergency response during disaster	DPHE	Proposal prepared by DPHE send to LGD by 2011 Disaster response system for the WSS sector functional under new Standing Order	Reviewed and updated	Reviewed and updated
PPP (Urban Utilities)	Appoint a facilitating agency (e.g., IIFC or consultants) to build capacity of LGD/PSU and sector institutions to gradually introduce PPP and support preparation of PPP guideline as mentioned in the National Policy of WSS 1998	PSU	Facilitating agency appointed by 2011 PPP guidelines prepared by 2012		
	Follow a transition path to PPP by first starting with simple types like service contracts and management contracts	WASAs DPHE, City Corporations and Paurashavas	Contract guidelines prepared by WASA, DPHE and LGIs by 2012 Service contracts and some management contracts on pilot basis initiated by 2013	Management contracts scaled up	Higher forms of PPP initiated

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	Medium Term (2015-20)	Long Term (2020-25)
LEAD RESPOBSIBILITRY: Common to Sector Agencies (WASAs, DPHE & LGIs)					
Surface water	In the context of increased future need, particularly in large cities, the availability of surface water need to be considered carefully in terms of factors like seasonal variations, possible upstream withdrawal and increased salinity due to climate change.	BWDB WARPO	Coordination mechanism with BWDB and WARPO established with sector agencies by 2011 Guideline for surface water use, including artificial recharge, prepared by sector agencies by 2012	Reviewed and updated	Reviewed and updated
Groundwater	Build capacity of sector organizations including creation of permanent and contract positions of groundwater specialists in key sector agencies like WARPO, DPHE, WASAs and BWDB	BWDB WARPO	Proposals sent by agencies to their ministries by 2011 Groundwater specialist position included in agency organogram by 2012		
Vulnerable Groups	Designate focal persons for vulnerable groups in concerned WSS sector agencies for coordination and technical guidance Undertake a learning approach and prepare guidelines, design tools and specific approaches for the different vulnerable groups	NGOs	Focal persons designated by 2011 Guidelines and tools prepared by agencies by 2012 and mainstreamed by 2013	Reviewed and updated	Reviewed and updated

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	**Medium Term (2015-20)**	**Long Term (2020-25)**
Research and Development	Scale up R&D activities in the development projects and disaster management programs. Build partnerships with international institutes and create a network of national and international professionals Strengthen institutional capacities of WSS agencies through training and guidance programs, and arranging equipment and proper testing facilities	PSU, DPHE	R&D capacities and budgets increased Successful R&D mainstreamed Network operational by 2102	R&D capacities and budgets increased Successful R&D mainstreamed	R&D capacities and budgets increased Successful R&D mainstreamed
Climate Change, Environment and Disaster Management	Establish a new unit for Climate Change, Environment and Disaster Management (CCEDM) or allocate the functions to an existing unit in key WSS sector agencies like WASAs and DPHE. Build staff capacities, including training on related subjects	DPHE, WASAs	Proposal sent to LGD by agencies by 2011 Specialized units on CCEDM established in sector agencies by 2012	CCEDM capacities strengthened	CCEDM capacities strengthened
	Pursue and coordinate water pollution control measures especially in areas around large cities which are the major contributors of pollution Build capacities of sector institutions (WASA, DPHE & LGED) and communities to protect environment, adapt to climate change and build	DOE	Inter-ministry coordination meetings held regularly Agencies cooperating with DOE and others agencies for	Capacities of WSS sector institutions and communities strengthened	Capacities of WSS sector institutions and communities strengthened

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	**Medium Term (2015-20)**	**Long Term (2020-25)**
	resilience for disaster management		prevention of river pollution in large cities Training programs conducted		
	Take early preparedness steps such as mobilizing staff, vehicles and supplies during warning period. Ensure that the water and sanitation facilities are functioning in strategic locations like cyclone shelters.	DMB	Office Orders issued by agencies by 2011 Preparedness steps ensured and routinely monitored by agencies	Preparedness steps ensured and routinely monitored by agencies	Preparedness steps ensured and routinely monitored by agencies
	Construct at least a few water and sanitation installations in disaster prone areas that are resistant to disaster so that the people of the locality can use those during emergency Coordinate with local administration, NGOs and other agencies, specifically through the local Disaster Management Committees for effective response	DMB/NGOs	Coordination and monitoring mechanisms developed and followed by agencies Some WSS installations established by 2012	WSS installations increased and improved	WSS installations increased and improved
LEAD RESPOBSIBILITRY: WASAs					
INSTITUTIONAL STRENGTHENING					
Policy Matrix	Implement the Policy Matrix as contained in the Partnership Framework Agreement between the GoB and DPs. The Policy Matrix addresses three key areas: i) strengthening governance and organization structure, ii) improved financial	LGD / DPs	Policy Matrix implemented according to agreed schedules plans	Policy Matrix assessed and updated	Policy Matrix assessed and updated

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	**Medium Term (2015-20)**	**Long Term (2020-25)**
	management capacity, and iii) sustainable service delivery				
Corporate Image	Involve customers more in planning, implementing operating and maintenance of WSS programs and facilities Create a positive corporate image by highlighting customer excellence in the provision of services, transparency and accountability in its operations	City Corporations, Rajuk, Chittagong Development Authority, Khulna Development Authority	Customer satisfaction survey reports prepared by WASAs and reviewed by LGD One-stop customer service units established by 2012	Customer survey reports prepared by WASAs and reviewed by LGD	Customer survey reports prepared by WASAs and reviewed by LGD
IMPLEMENTING AGENCY: DPHE					
INSTITUTIONAL STRENGTHENING					
Restructuring DPHE	Restructure DPHE to address the increased and new roles and responsibilities with regards to • More support to the urban subsector • Climate change, environment and disaster management • R&D and groundwater monitoring • Private sector participation • Hygiene promotion • Planning and implementation, including social development issues like participation and empowerment of communities and vulnerable groups • Institutional strengthening support to the the LGIs	LGIs	Concept note on restructuring and capacity building submitted by DPHE to LGD by 2011 DPHE restructures organogram approved by GOB and functioning by 2013	DPHE organogram reviewed and updated	DPHE organogram reviewed and updated

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	**Medium Term (2015-20)**	**Long Term (2020-25)**
DPHE organization and HRD development	Strengthen DPHE capacity based on a comprehensive HRD plan, logistics, improved systems, procedures and guidelines to carry out its new roles Increase capacities and outreaches of water testing laboratories and field testing facilities	LGD	First Capacity Building Program (TPP/ DPP) implemented by 2015	Second Program implemented by 20202	Third Program implemented by 2025
Support to LGIs	Prepare a program provide capacity and investment support to support the LGIs under the tripartite agreement: – Support City Corporations and Paurashavas to: i) Prepare master plans, ii) build operational and financial management capacities, iii) install water meters, iv) repair, wastage and leakage control and upgrade the water supply systems, v) consumer care and customer relationship, and vi) improve management of sludge from septic tanks and pit latrines – Support the Union Parishads to plan, implement and monitor rural water supply and sanitation	LGD	First Capacity Building and Investment Program implemented by 2015	Second Capacity Building Program implemented by 2020	Third Capacity Building Program implemented by 2025
THEMATC AREAS					
Water Quality	Review the existing water quality testing protocol and develop a comprehensive protocol Establish water quality monitoring system, including water quality surveillance, and delineating the roles and responsibilities of local and central government institutions	BCSIR / BSTI /LGIs/ NGOs	Water quality testing protocol developed by DPHE by 2011 Water quality monitoring system integrated in SIS by 2014	Reviewed and updated	Reviewed and updated

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	**Medium Term (2015-20)**	**Long Term (2020-25)**
Arsenic Mitigation	Take immediate actions for arsenic mitigation in 188 Unions with very high arsenic contamination and low safe water coverage and 212 unions with high arsenic contamination and low safe water coverage, as identified by DPHE JICA Study 2010	LGIs/ NGOs	Priority projects completed in 188 and 212 Unions by 2013	Arsenic mitigation projects implemented in other areas	Arsenic mitigation projects implemented in other areas
Water Safety Plan	Prepare an integrated IEC Guideline for WASH promotion which will include Water Safety Plan, hygiene promotion, proper operation and maintenance of water and sanitation facilities Build capacities of sector stakeholders by first creating a pool of ITN-BUET-trained master trainers from different government organizations, NGOs and academic institutions and then using the master trainers of these organizations to transfer the concept and skill gradually down the line up to grassroots level	MoH& FW /LGI/ ITN/ NGOs	IEC Guideline prepared by DPHE by 2011 and mainstreamed in existing and new projects by 2012 Training program for master trainers conducted by 2012	Review and improved	Review and improved
Hygiene Promotion	Prepare an Integrated IEC Guidelines as mentioned above	MOH&FW/ LGI/ ITN/ NGOs	As in Water Safety Plan above	As in Water Safety Plan above	As in Water Safety Plan above
	Coordinate with sector partners like NGOs and private sector and inter-sector partners like Health Assistants at ward levels of the MoHFW.	MoH&FW/ LGI/ ITN/ NGOs	Stakeholders' meetings held regularly Project implementation and monitoring conducted in collaboration with MoH&FW	Reviewed and updated	Reviewed and updated

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	**Medium Term (2015-20)**	**Long Term (2020-25)**
Public Private Partnership	Rural Market: – Build capacities of rural entrepreneurs to meet the present and future challenges – Use the social, administrative and legal instruments of the LGIs to monitor and ensure the quality of services delivered at the household levels	LGIs/ private sector	Private sector capacity building program implemented and regularly monitored by DPHE and LGIs	Private sector capacity building program implemented and regularly monitored by DPHE and LGIs	Private sector capacity building program implemented and regularly monitored by DPHE and LGIs
	Small Scale Service Provider: – Continue piloting and assessing different rural piped water supply models, objective to scale up appropriate models – Provide technical and management support to strengthen existing businesses and develop new businesses like sludge management in urban areas	LGIs/private sector	Lessons learned from pilots reviewed and scaled up Increased participation of small-scale service providers	Increased participation of small-scale service providers	Increased participation of small-scale service providers
Environment, Climate Change and Disaster Management	Formulate an integrated CCEDM) Guideline, in line with EIA, to incorporate climate change adaptation, environment pollution control and disaster risk reduction for planning and implementation of WSS development projects	DMB/NGOs	CCEDM Guidelines prepared by DPHE and submitted to LGD and DMB by 2011 Incorporated in existing and new projects by 2012	Reviewed and updated	Review and updated

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	Medium Term (2015-20)	Long Term (2020-25)
LEAD RESPOBSIBILITRY: City Corporations and Paurashavas					
INSTITUTIONAL STRENGTHENING					
Capacity building of Water And Sanitation Sections	Enhance the capacities of PWSS of City Corporations and Paurashavas in the short run through, among others: i) staff recruitment and training, ii) establishment of separate accounts for PWSS and introduction of double entry accounting system Provide PWSS more autonomy in the long run to operate in commercial terms	LGD, DPHE	First Capacity Building and Investment Program implemented by 2015	Second Capacity Building Program implemented by 2020	Third Capacity Building Program implemented by 2025
Participation and customer care	Evolve TLCC to oversee and ensure accountability of the operations of the PWSS Engage customers more in planning, implementing operating and maintenance of local WSS facilities Create a positive corporate image by highlighting customer excellence in the provision of services, transparency and accountability in its operations		TLCC established in all City Corporations and Paurashavas by 2012 One-stop customer care unit established in City Corporations and Paurashavas by 2013	Reviewed and updated	Reviewed and updated

Items	Actions Points	Associate Responsibility	Indicative Milestones		
			Short Term (2010-15)	Medium Term (2015-20)	Long Term (2020-25)
LEAD RESPOBSIBILITRY: Union Parishads					
INSTITUTIONAL STRENGTHENING					
Union Parishads	Formulate village-level committees, with support from NGOs or by their own initiatives, and establish their linkage with the formal committees (WATSAN Committees)	LGD/ DPHE/ NGOs	Village Committees formed by 2012 and participating in Union WATSAN Committees for local planning, implementation and monitoring of WSS facilities	Reviewed and updated	Reviewed and updated
	Improve working procedures and accounting by participating in capacity building programs arranged by DPHE and other organizations Gradually take over the roles of planning, implementation and monitoring of the rural water and sanitation	DPHE	First Capacity Building and Investment Program implemented by 2015	Second Capacity Building Program implemented by 2020	Third Capacity Building Program implemented by 2025