
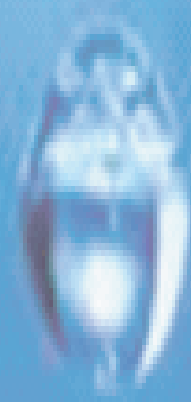
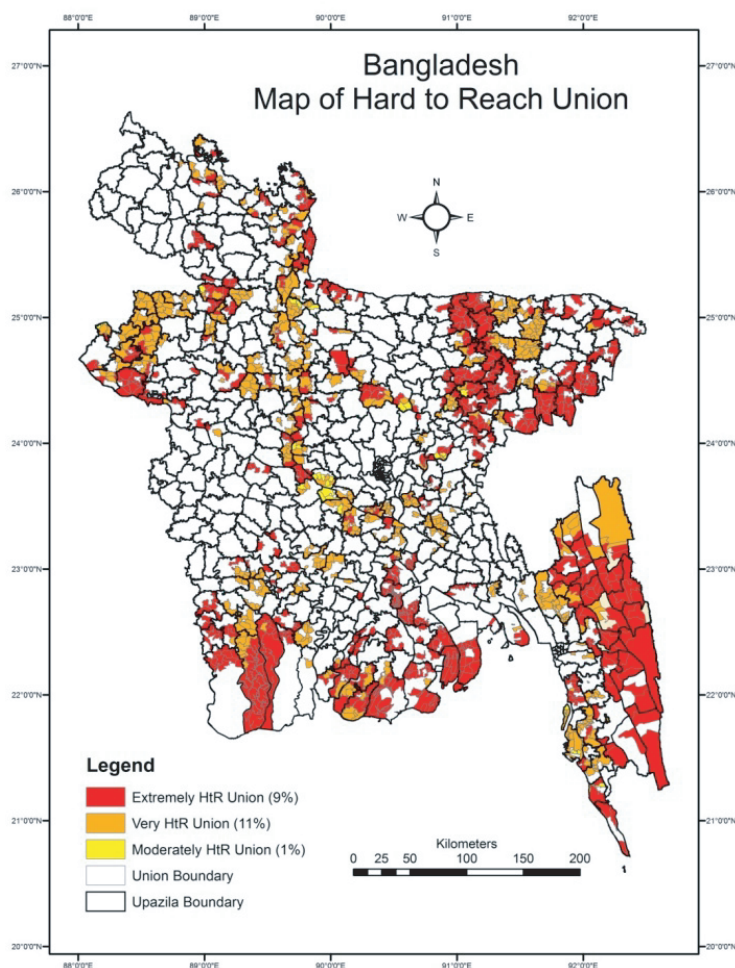




Government of the People's Republic of Bangladesh  
Ministry of Local Government, Rural Development and Cooperatives  
Local Government Division



# **National Strategy for Water and Sanitation Hard to Reach Areas of Bangladesh 2012**



## National Strategy for Water and Sanitation Hard to Reach Areas of Bangladesh

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

## PREFACE

One of the major development goals of the government is to ensure access to safe water and sanitation for all. It is encouraging that water and sanitation coverage in Bangladesh has significantly improved in last couple of years. The safe water coverage (as per basic Bangladesh standard) has reached to 74% and that of sanitation to 80.4% in both urban and rural areas except in extremely poor hard to reach areas. Due to extreme poverty and poor communication network people of coastal, wetland, char, barind, hilly and urban slum areas cannot access mainstream services including water and sanitation. In absence of appropriate technological options, availability of safe water and sanitation facilities in these areas remains in a precarious condition and people are severely affected by unsafe water, poor sanitation and unhygienic practices.

Despite having a good number of policies and strategies in the water and sanitation sector, the hard to reach areas still lack proper attention and initiative to improve their water and sanitation condition. The major challenges in providing water and sanitation services in the hard to reach areas are frequent natural disaster (cyclone, flood, river erosion and tidal surge), salinity intrusion, fluctuating ground water level, rocky formation in the subsurface layer, dispersed settlement, poverty, poor water and sanitation infrastructure etc. The challenges are unique in their nature based on variation in hydro-geological, socio-economic and socio-cultural condition of those and are aggravated by the adverse impacts of climate change. So area specific water and sanitation strategies suggesting different sustainable technological solutions and immediate measure are crucial for facing the growing challenges of hard to reach areas. The strategies should appropriately address the variability in technological need, socio-cultural diversities and poverty situation. Above all, the planning, investment and promotion of water and sanitation facilities must address the special needs and priorities of the hard to reach areas and thus should incorporate the effort of LGIs, NGOs and private sector.

After long consultation with the sector based stakeholders and experts, the Policy Support Unit supported by WSP- World Bank under supervision of Local Government Division has come up with specific strategies. These area specific water and sanitation strategies are expected to bring significant change in terms of improved water and sanitation, reduce the gap and ensure balanced development in provisioning sustainable water and sanitation throughout the country.

I would like to thank all concerned who contributed in formulating these national level strategies specifically designed for hard to reach areas. Special thanks to Water and Sanitation Program-World Bank for their all out support for preparing this strategy paper.

Finally I would like to take the privilege of introducing this National Strategy for Water and Sanitation in Hard to Reach Areas of Bangladesh. 2012 for all stakeholders. I hope it will be adopted by all the stakeholders and used to intervene in hard to reach areas.

Abu Alam Md. Shahid Khan

## Acknowledgement

Bangladesh is a country of huge reservoir of surface water, but availability of safe drinking water is still a great challenge in Bangladesh especially in the Hard to Reach areas of the country. The country is blessed with abundance of groundwater, which is the principal source of drinking water. But due to intrusion of saline water, fluctuating water table, unavailability of suitable water aquifer, ground water supply is difficult in many parts of the country. The problem is acute in Hard to Reach areas, which are inaccessible due to difficult geographic setting and where safe water sources are rarely available. The people living in these areas are extremely poor and exposed to frequent natural disaster. For the same reason, sanitation situation is also precarious in hard to reach areas, although Bangladesh has made tremendous progress in sanitation in recent few years. Intensive rain, cyclone, flash flood etc poses a threat for sustainable sanitation in Hard to Reach areas. Moreover, unavailability of appropriate technological solutions also makes WSS provision difficult in Hard to Reach areas.

According to Bangladesh Basic Standard, the present country water supply coverage is 74 percent and sanitation coverage is 80.4% percent, but this coverage is extremely poor in Hard to Reach areas, which is pulling down the progress of country coverage. So far, 1144 Unions under 257 Upazillas of 50 districts have been identified as Hard to Reach areas where special policy measures are needed to make the water supply and sanitation services equitably available to the poor and disadvantaged people living in Hard to Reach areas. This is perhaps the only way to further improve the water supply and sanitation coverage of the country towards satisfying the national target as well as Millennium Development Goal.

This strategy paper has been designed carefully in consideration of unfavorable and varying geo-physical and geo-hydrological contexts of the Hard to Reach areas suggesting area specific appropriate technological solutions for providing immediate and sustainable water supply and sanitation services. This was indeed a very difficult task and I am pleased that Policy Support Unit of the Local Government Division, Ministry of LGRD&C, with support and cooperation other sectoral stakeholders and experts has completed this task successfully. I would like to convey my thanks to the concerned personnel of PSU, who took the initiative and gave their utmost effort to prepare this National Strategy for Water and Sanitation in Hard to Reach Areas. Particularly, I would like to express my gratitude to Water and Sanitation Program (WSP) of World Bank for extending their full support to formulate and finalize this strategy paper. I hope the strategy paper will help the concerned government agencies, development partners, NGOs and private sector to design appropriate program for bringing water supply and sanitation services to the doorsteps of poor vulnerable people in Hard to Reach areas of the country.



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## 1 Background

National water and sanitation coverage in Bangladesh has improved significantly over the last few years, but there are pockets of areas that have received very little attention due to geophysical, socio-cultural and economic situation. With very little infrastructural development, road communication network in particular, water and sanitation coverage in these areas still remain much below the basic minimum level. Extreme poverty in these hard to reach (HtR) areas exacerbates the water and sanitation crisis. While the Government of Bangladesh has set its targets of achieving full coverage of water and sanitation by 2011 and 2013 respectively these areas need special attention in different aspects of development including technological options, social mobilization, financial resources, and service delivery mechanism because of special geographical, hydro-geological and social setting.

Initiatives were taken by different organizations to improve water and sanitation services in the HtR hill areas, river islands, haor areas, urban slums, and tea gardens that evolved a variety of experiences and new knowledge thus forming the basis for further development in those areas. The learning workshop organized by the PSU (2008) has set the direction towards developing a national strategy on water and sanitation for hard to reach areas and people of Bangladesh. The workshop provided the following relevant recommendations:

- Prepare a clear definition of HtR areas and people.
- Conduct base line survey to identify the areas and prevalent issues.
- Geographical, Technological, Social and Environmental aspects should be considered for identifying HtR areas and people.
- All sector actors should take initiative to allocate separate funds for developing affordable and appropriate technologies for HtR areas and people through research and development.
- Give special emphasis to increase WSS service coverage among un-served, underserved, hardcore poor and remote area population, i.e., CHT, Haor areas, Urban slums, Char lands, Coastal belt, Tea Gardens, etc.
- Ensure participation of all caste, ethnic groups and women in the action plan for HtR areas and people.
- Voices of HtR people to be established through LGIs.

It is therefore, important that the strategy explores the challenges, identify strategies for sustainable solutions and indicate responsible authorities for improving water and sanitation services in these HtR areas. To formulate the strategy it is also important that the physical locations of HtR areas are identified and demarcated using appropriate hydro-geological and socio-economic indicators.

## 2 Policy Principles

The functions of the water supply and sanitation sector in Bangladesh is guided primarily by the following important policies and strategies.

National Policy for Safe Water Supply & Sanitation (NPSWSS), 1998  
National Policy for Arsenic Mitigation & Implementation Plan, 2004 (NAMIP)  
National Sanitation Strategy (NSS), 2005  
Pro-Poor Strategy for Water and Sanitation Sector (PPSWSS), 2005  
National Sector Development Programme (SDP) for Water Supply and Sanitation, 2010

The NPSWSS 1998 is the most significant policy for the WSS sector. The Policy mentions that the national goal is to ensure that all people have access to safe water and sanitation services at an affordable cost and aims to bring about changes in the traditional service delivery arrangement and to increase the capacity of the sector. The policy emphasizes community sanitation in densely populated poor communities without sufficient space for individual household latrines. It further mentions that appropriate water supply and sanitation technology options shall be adopted to specific regions, geologic situations and social groups. Continuous research and development activities shall be conducted to improve existing technologies and to develop new technologies.

It calls for promoting the role of women, decentralization of services and emphasizes the participation of users in planning, development, operation and maintenance of WSS facilities through local government. The Policy also recognizes the important roles of the NGOs and private sector in service development and delivery.

The NSS 2005 was prepared to guide and coordinate the National Sanitation Campaign promoted by the Government and other stakeholders in the light of the policy principles stated in the NPSWSS 1998. The PPSWSS 2005 was formulated to provide a safety net to the poor.

The National Water Policy 1999 and the National Water Management Plan 2004 give broad directions for water resources management involving seven sectors, including WSS sector. Formulation of Bangladesh Water Act is presently under consideration.

The revised Sector Development Program (SDP, 2010) provides a comprehensive development plan for the water supply and sanitation sector for the next 15 years in phases. The SDP (2010) identifies the gaps prevailing in the sector throughout the country and estimates resource requirements for implementation of the plan and suggested changes in service delivery, capacity building, monitoring and coordination mechanisms.

While the above policies and strategies form the basis of ensuring water and sanitation services in the country, adopting the following important principles strengthens the framework that ensures access to services for all citizens irrespective of where one lives.

- Safe drinking water and sanitation is a basic human right and therefore it is the obligation of the national government to ensure access to safe water and sanitation equitably and without discrimination
- Subsidies are to be given to the poorest and disadvantaged groups of people living in vulnerable areas without definite livelihood opportunities
- Voices of the grass roots are to be heard prior to development decisions
- Social values, cultural practices and technical appropriateness are important considerations for effective development of water and sanitation services
- Decentralization of decision-making is extremely important for sustained services
- Equitable allocation of resources throughout the country, considering population and level of development of different areas including the HtR areas and people

### 3 Objectives of Developing the National Strategy for HtR Areas

The primary objective of formulating yet another national strategy is to improve safe drinking water and sanitation coverage in hydro-geologically and socio-economically difficult areas where people have services much less than the national standard. The specific objectives of the national strategy formulation are –

- to develop meaningful definitions of hard-to-reach areas and people, through considering adverse geographical locations, hydro-geological and socio-demographic conditions;
- to develop criteria for isolating HtR areas based on assessment of present water and sanitation coverage, hydro-geologic conditions represented by water availability, vulnerability to natural disasters, and socio-economic parameters; and
- to identify challenges and develop strategies for improved WSS services to reach the HtR areas.

### 4 Definition of Hard to Reach Area and People

HtR areas is defined practically in Bangladesh by taking into account both hard-to-reach in terms of remote geographical locations and slipping population from all sorts of development activities. The community composition, ethnicity, religious and natural environment and geo-physical traits are determinant factors in achieving success in water and sanitation coverage and behavioral change. Based on this broad notion and the practical experience of the water and sanitation sector, HtR areas and people are defined as,

“areas having poor water and sanitation coverage due to adverse hydro-geological condition, having poor and inadequate communication network, and frequent occurrence of natural calamities which in turn results in higher rate of child mortality and accelerates the vicious cycle of poverty, are referred as hard-to-reach areas and the people of those areas as well as people who do not have any fixed place for living, e.g., gypsies, sex workers, are called hard-to-reach people due to their social exclusion from adequate W atSan services”.

## 5 Approach and Methodologies for Identifying Hard to Reach Areas

### 5.1 Indicators for Identifying HtR Area

Review of current research reports, consultation with experts, discussions and series of meetings and workshops with the sector people, NGOs, Government agencies, academia, policy makers and selected community people suggest that underlying basis of HtR areas in Bangladesh is the consideration of two broad perspectives – “geographic location and hydro-geological condition”, and “socio-economic profile”, that can be established based on several measurable and usable indicators.

Six measurable and usable indicators were identified through consultation among stakeholders, of which the first four relates to hydro-geographical and two to socio-economic perspective. These indicators are usable in terms of data availability and reliability in the context of Bangladesh and are as follows:

1. Availability of water (indicated by the level of groundwater table)
2. Improved drinking water coverage
3. Hygienic sanitation coverage
4. Climatic hotspots
5. Poverty level
6. Child mortality

### 5.2 Classification of HtR Area

The next step was to establish suitable criteria in terms of depths of groundwater table, percentage coverage of improved water supply and sanitation, various disaster spots, poverty level, and child mortality rates, and ranking them for each indicator which were then used to classify HtR areas.

A categorized scale has been used to rank the ranges from 3 to 1, in which, 3 indicates extremely HtR area, 2 indicates very HtR area and 1 indicates moderately HtR area. Details of the ranking, identification and classification of HtR areas in Bangladesh can be found in a separate study (WSP, 2011). All the HtR areas are then classified into three categories:

- i) Extreme HtR areas where service level is extremely poor
- ii) Very HtR areas where service level is much lower than standard
- iii) Moderate HtR areas where service level is lower than standard

It prompts that people living in extreme and very HtR areas are marginalized and lack enough financial capital to adopt expensive water and sanitation technologies. Moreover, these people living below the poverty line, engaged in poor income generating livelihood options, find it very difficult to feed their families and overlook concerns over hygiene and proper water and sanitation services.

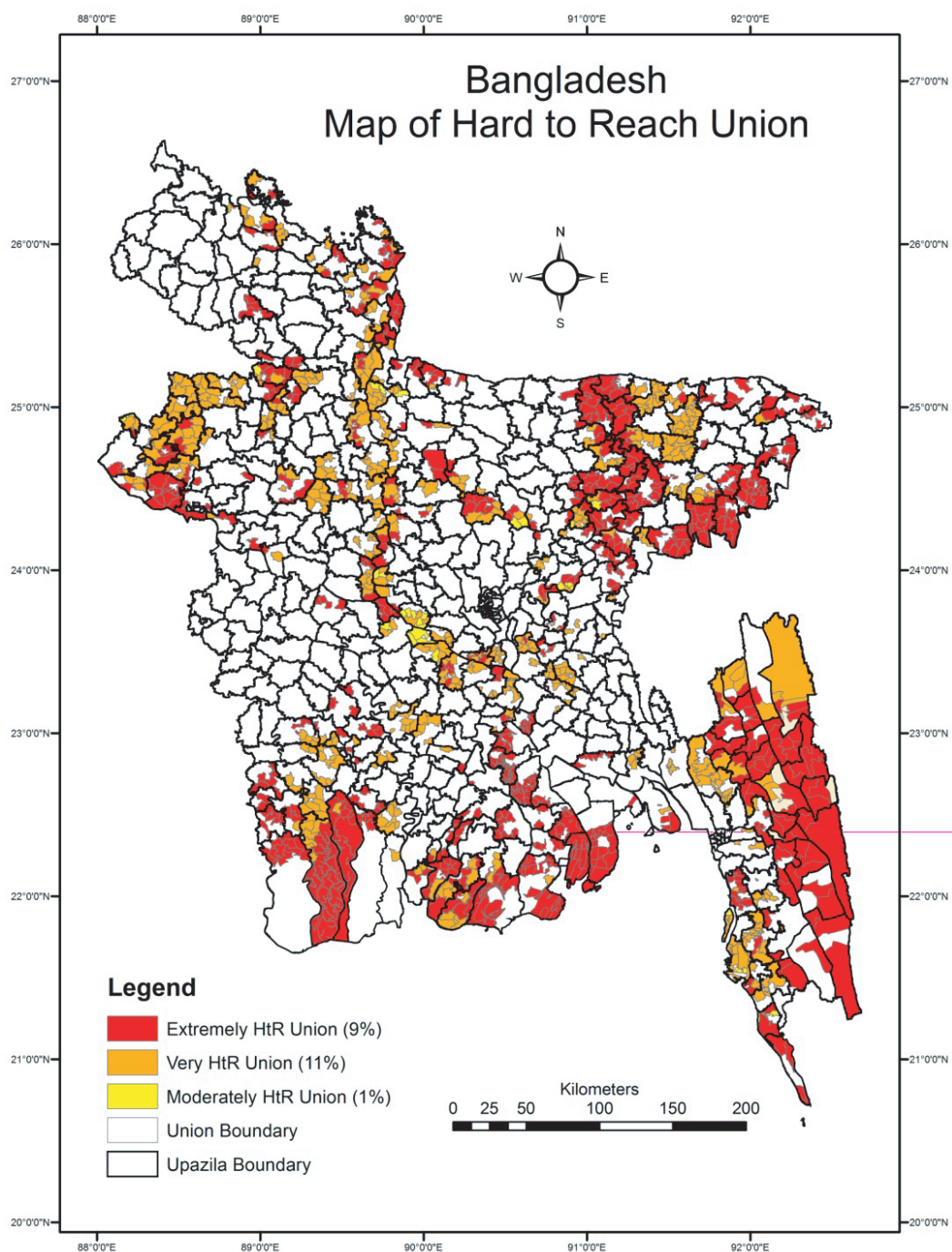
In addition, extreme HtR areas are also vulnerable to natural hazards and often exposed to unanticipated disaster. In terms of coping with extreme calamities people need to reconstruct their homestead as well as water and sanitation services repeatedly. Thus, it is crucial to consider by all concerned effective financial assistance and pro-poor adaptation strategies for identified extreme and very HtR areas in Bangladesh.

### 5.3 Identification of HtR Areas in Bangladesh

Considering six indicators and their respective criteria and ranking, from Multi Criteria Analysis, 1144 HtR unions (21%) under 6 different geographic categories were identified which spreads over 257 Upazilas and 50 districts in Bangladesh. District wise map of all hard to reach unions were produced.

It is however, important to note that mapping for identification of HtR areas using Multi Criteria Analysis is a dynamic process and the number of unions at different geographic locations may vary as data for the six chosen indicators change with time. Such changes may occur as a result of improvement in some areas due to appropriate interventions or deterioration in other areas due to more frequent natural disasters that has been predicted as impact of climate change.

The Map of HtR areas (Figure 1) and summery findings of the HtR mapping are stated below in Tables A and B:



**Figure 1: Map of Bangladesh showing HtR areas**



**Table A: Categorized summary of HtR areas based on physiographic conditions and spatial distribution of Bangladesh:**

SL	Physiographic Condition	No. of District	No. of Upazila	No. of Union
1	Barind	8	31	123
2	Beel	6	18	64
3	Char	20	88	353
4	Coast, Offshore Island & Saline	6	39	213
5	Haor	4	29	164
6	Hilly	6	52	227
<b>Coverage</b>		50	257	1144

**Table B: Total number of unions based on Hard to Reach Ranking:**

HtR Class	Barind	Beel	Char	Coast, offshore Island & Saline	Haor	Hilly	Total
<b>Extremely</b>	50	26	122	141	96	147	582
<b>Very</b>	71	38	211	70	66	76	532
<b>Moderately</b>	2		20	2	2	4	30
<b>Total</b>	123	64	353	213	164	227	1144

## 6 Strategies to Improve Water and Sanitation Services in HtR Areas

From the past research and literature, it is notable that, a steady paradigm shift occurred in water and sanitation sector of Bangladesh. For instance, change in water supply from traditional drinking water sources towards hand pump tube wells to piped water as well as use of hygienic latrines instead of open defecation are all adopted by the people. Thus, adoption of changes in attitude and behavior are possible through motivational campaign and through proper planning, design, and implementation of effective strategies in water and sanitation sector.

There exist sector specific strategies that are also related to water and sanitation sector instead of area specific policies and rules. However, it is fundamental to construct disaggregated strategies while considering the geophysical and hydrological remoteness in order to develop overall water and sanitation strategies of the country. In addition, adequate local government autonomy, capacity, and good governance are all very important to address the water and sanitation problems in the hard-to-reach areas.

## 6.1 Overall WatSan Strategies

Several aggregated strategies required in all of the extreme, very and moderate Hard-to-reach areas of Bangladesh, are given below:

- Bangladesh already have bundles of legal instruments for the water and sanitation sector such as acts, ordinances and rules specifying the roles and responsibilities of various sector institutions such as; Environmental Conservation Act 1995 and Environmental Conservation Rules 1997 set the quality of water to be supplied and requirements of disposal of effluents into water bodies, WASA Act 1996 describes the roles and responsibilities of WASAs, different Local Governments Acts of 2009 for City Corporations, Paurashavas, Upazila Parishads and Union Parishads describe the functions and responsibilities of the LGIs and so on. Thus, it is vital to ensure effective enforcement of all of the existing rules and regulation in water and sanitation sector of all of the identified Hard-to-reach areas of the country.
- After the implementation of these laws, adequate monitoring and evaluation is also crucial in all of the hard-to-reach areas.
- Enhance the local government autonomy in these regions and also ensure transparency and accountability of WatSan fund.
- Implement pro-poor strategy for water and sanitation in Bangladesh.
- Allocate funds for research and innovation of sustainable, eco-friendly and user friendly technologies for remote areas of Bangladesh.
- Inclusion of indigenous knowledge and traditional values through deliberative participation of local inhabitants in the mainstream decision making process.
- Incorporation of climate change and disaster management strategies in development plan of all Hard-to-reach areas of Bangladesh.
- Encourage public-private partnership in water and sanitation sector of these areas.

In order to enhance overall water and sanitation situation in these hard-to-reach areas, it is also crucial to consider technological, financial, and service delivery aspects. In hard-to-reach areas of Bangladesh, already there are bundles of policies, public-private partnership projects, research and development initiatives but mostly this sector lacks meaningful allocation of financial assistance, implementation of appropriate technologies and proper service delivery in remote areas.

For instance, in Coastal areas, innovation and implementation of arsenic or saline free water technology is fundamental, whereas, ensuring better service delivery to all regions starting from extreme to very HtR areas at a minimum cost are also crucial. Innovation of appropriate technology is not the prime strategy in these regions, since proper service delivery at household level and financial assistance are also correlated with the adequate policy design, planning, and implementation. In Hill areas, extraction of groundwater and its associated technologies are highly sophisticated and expensive. At the same time, service delivery in these hilly areas are also very time consuming and costly. On top of that, tribal inhabitants are poor enough to adopt such sophisticated technologies in their homestead. Therefore, it is essential to segregate

technological, service delivery and financial aspects of overall water and sanitation strategies in hard-to-reach areas from the overall strategies for ensuring better WatSan facilities.

## 6.2 Area Specific strategies

All of these above mentioned aggregated WatSan strategies need to further narrow down, since some problems are very unique in a particular region due to geophysical or hydrological or even socio-economic conditions. For example, in Coastal, Char and Wetlands, due to extreme remoteness and hydro-geophysical condition, problems and relevant effective strategies are technology-dependent, whereas, the hard-to-reach people of urban slums, though have better road and communication system, still suffer due to ignorance of government authorities regarding water and sanitation initiatives. In Barind tract, recharging of water table and aquifers in terms of ensuring water availability is highly techno-centric and their maintenance also depended on well-trained and skilled workers. Apparently, in all hard-to-reach areas around Bangladesh requires effective enforcement of existing water and sanitation policies, co-ordination among the public and private authorities, active participation of relevant stakeholders in decision making procedures, accountability and transparency of development fund and so on. In Barind tract, establishment of regulatory framework and taskforce regarding monitoring extraction of ground water is necessary since, people in many cases are involved in wasteful use of ground water for irrigation. However, in Barind extreme and very hard-to-reach areas, people need enough financial assistance regarding adoption of sophisticated and costly water and sanitation technologies.

In contrast, formulation and implementation of separate strategies for Char, Wetlands, and Hard-to-reach people are needed to be addressed since they have very unique water and sanitation problems. However, in Hilly areas, local values and cultural practice should be given due considerations. Technologies should be viable, affordable, and locally appropriate. In addition, indigenous knowledge and local skills must be incorporated in formulating hill strategies. It has been found in all categories of hard-to-reach areas, that poor people require financial assistance for adoption of technologies but mostly dwellers of extreme hard-to-reach areas, are extremely poor to construct individually.

In general, the planning, investment and promotion of sanitation facilities must address the special needs and priorities of women and children. For instance, in Coastal and Char areas, gender aspects in cyclone and flood shelters need full consideration in water and sanitation programs. It is also crucial to establish public private partnership approach regarding promotion of water and sanitation facilities in remote areas, such as NGOs role in terms of inclusion of socially excluded people in the every sphere of life through their several empowerment activities are well accepted around the globe. A part from the centralized/ project based subsidized services, local resources (kind/ cash) at the local government institution level needs to be mobilized to assist the hardcore poor on a priority basis based on their poverty ranking.

In all of the extreme hard-to-reach areas of Bangladesh, people require cost effective, sustainable and user friendly water and sanitation facilities, since, in the extreme regions, people are extremely

poor and at the same time vulnerable to seasonal and unanticipated natural hazards. Furthermore, advancement and upgrading of effective technologies and participatory hygiene methods through research and development of appropriate and affordable technologies and management systems need to be addressed in all categories (extreme, very and moderate) of six Coastal, Char, Wetlands (Haor and Beels), Hills, Barind hard-to-reach areas and people in urban slums.

### 6.2.1 Strategies for Coastal Areas

<b>Coastal Challenges</b>	<ul style="list-style-type: none"> <li>■ Salinity intrusion due to natural causes e.g., storm surge, sea level rise and estuarine tidal action, as well as anthropogenic reasons, e.g., abstracting saline water for shrimp culture, is affecting both surface and groundwater sources.</li> <li>■ Water and sanitation infrastructure damage due cyclone, tidal surge and inundation of low lands and off-shore islands.</li> </ul>
<b>Strategies for Sustainable Solutions</b>	<p>These challenges need to be addressed in a holistic manner. Changes are needed in housing locations and patterns for human settlements in off-shore and near shore villages. Possible specific strategies for long term sustainable solutions may include –</p> <ul style="list-style-type: none"> <li>■ Construction of reinforced houses in clusters on raised grounds along with individual or community type drinking water and sanitation infrastructures.</li> <li>■ Constructing desalination plants and rainwater harvesting with underground reservoirs to be located on highlands e.g., cyclone shelters, schools, madrasahs, office buildings, market places etc for community water supply.</li> <li>■ Appropriate sanitation technologies may include twin off-set pit pour flush latrines, individual or community type ecological sanitation facilities and community septic tank systems depending on community choice.</li> <li>■ Transportation infrastructure is also an essential element to facilitate communication and therefore forms an integral part of overall development of coastal hard to reach areas.</li> </ul>
<b>Strategies for Immediate Solutions</b>	<p>Until the changes in housing locations and patterns are made and human settlements are developed in less vulnerable areas, the following options may be adopted as immediate solutions for the drinking water and sanitation challenges in coastal areas:</p> <ul style="list-style-type: none"> <li>■ Tubewells with appropriate treatment units for arsenic, iron or salinity removal, desalination plants for treating saline surface water, rain water harvesting, PSFs with raised and lined ponds are</li> </ul>

	<p>recommended drinking water technologies for application in coastal areas.</p> <ul style="list-style-type: none"> <li>■ Raised simple or pour flush pit latrines with sand envelopes for pollution prevention along with tubewells with raised platforms.</li> </ul>
<b>Development Decision and Ownership</b>	<ul style="list-style-type: none"> <li>■ The Community and the LGI, e.g., Upazila/ Union Parishad</li> </ul>
<b>Design and Implementation</b>	<ul style="list-style-type: none"> <li>■ DPHE, LGED, Disaster Management Bureau and NGOs will provide technical assistance in design and installation of facilities while concerned LGI with effective participation of the community will implement.</li> </ul>

## 6.2.2 Strategies for Char Areas

<b>Challenges of the Char Areas</b>	<ul style="list-style-type: none"> <li>■ Regular inundation of most parts of Char areas occurs due to rainfall flood during monsoon and frequent upstream flush floods leaving the homesteads, drinking water and sanitation infrastructures particularly hand tubewells and low cost pit latrines damaged.</li> <li>■ The Char areas, largely inhabited by the marginalized and the poor, face the adversity of extreme poverty on a growing scale and the basic services including drinking water and sanitation largely remain inaccessible.</li> </ul>
<b>Strategies for Sustainable Solutions</b>	<ul style="list-style-type: none"> <li>■ Planned development of community living is needed for sustenance of basic service infrastructures including drinking water and sanitation.</li> <li>■ Instead of unplanned, sparse settlement, some portion of char land needs to be raised, flood protected, and basic infrastructures developed including appropriate housing, health, education, drinking water and sanitation.</li> <li>■ The remaining char lands that are subject to regular inundation would then be available for seasonal agriculture, fisheries and other livelihood opportunities.</li> <li>■ In large char areas there could be several raised portions for self-contained community living.</li> </ul>

	<ul style="list-style-type: none"> <li>■ Such development approach needs to be steered by relevant government ministries within a strict policy framework with effective participation of LGIs, NGOs and the community.</li> <li>■ Drinking water infrastructure that may be considered appropriate for such development include individual tubewells, rainwater harvesting, community level arsenic/iron removal unit for groundwater, filtration units for surface waters with small scale pipe network for distribution.</li> <li>■ While low cost ring slab pits are not successful, sustainable sanitation options may include twin off-set pit pour flush technology, individual or community eco-toilet system, community septic tank system or biogas plant.</li> </ul>
<b>Strategies for Immediate Solutions</b>	<p>Until planned, sustainable development of communities in char lands is achieved, several modified/ improved versions of basic facilities may be considered as immediate solutions to the recurring challenges in char lands. Some examples are as below.</p> <ul style="list-style-type: none"> <li>■ Tubewells with raised platforms, rainwater harvesting and storage at individual household level, raised pond water treatment, subsurface storage of rainwater and protected dug wells for community supply may be considered as drinking water options in char lands.</li> <li>■ Pit latrines with plastic pan and rings, raised pit latrines with appropriate sand envelope, ecotoilets should be considered at individual household level, and</li> <li>■ Community toilets with multiple pits (plastic pan and rings) raised above flood level at public places such as bazaars, schools, madrashas, and other designated flood shelters should be considered for community use.</li> </ul>
<b>Development Decision and Ownership</b>	<ul style="list-style-type: none"> <li>■ The Community and LGI, Upazila/ Union Parishad</li> </ul>
<b>Design and Implementation</b>	<ul style="list-style-type: none"> <li>■ Local Authority, Char Development Authority (Proposed), DPHE, LGED and NGOs</li> </ul>

### 6.2.3 Strategies for Wetlands (Haors and Beels)

<b>Challenges of Wetlands (Haors and Beels)</b>	<ul style="list-style-type: none"> <li>■ Any intervention in the wetlands needs to be done with utmost care because of their ecological, hydrological and hence economical importance. Biologically these are the most productive ecosystems. These are the breeding and spawning grounds of numerous fish and other faunal species, and also the habitat of many species of indigenous and migratory waterfowls.</li> <li>■ In absence of an appropriate wetland policy however, haors and beels are mostly inhabited by the poor and disadvantaged people who lack access to basic services including drinking water and sanitation.</li> <li>■ Inaccessibility to services is compounded by the absence of adequate road communication network in these areas, primarily due to large fluctuations in water levels ranging from 3/5 meters deep water to dry land.</li> <li>■ People face natural disasters like monsoon floods, flush floods, and river erosion on a regular basis, washing away or damaging their homesteads and water and sanitation infrastructures.</li> <li>■ Drinking water tubewells get polluted due to inundation and people resort to unhygienic practices including open defecation.</li> <li>■ Arsenic contamination in groundwater is widespread without adequate remedial measures in many wetland areas.</li> </ul>
<b>Strategies for Sustainable Solutions</b>	<ul style="list-style-type: none"> <li>■ Human settlements and activities need to be regulated under an appropriate wetland protection policy in order to safeguard the rich ecosystems of Haors and Beels.</li> <li>■ Roads and communication systems need to be improved in Haors and Beels for other basic services to be accessible.</li> <li>■ Instead of isolated, individual homesteads, cluster homesteads on raised lands with community water, sanitation and other service facilities appear to be more viable and sustainable solution.</li> <li>■ A combination of surface water, groundwater and rainwater sources should be utilized for drinking water supply considering seasonal variations in water availability.</li> <li>■ Appropriate sanitation options may include individual twin off-set pit pour flush technology, multiple off-set pit pour flush facilities for community sanitation, and community septic tank systems.</li> <li>■ Further research for innovations, for instance to see the viability of</li> </ul>



	floating houses with floating sanitation facilities, are needed for wetland applications.
<b>Strategies for Immediate Solutions</b>	<ul style="list-style-type: none"> <li>■ Flood resistant tubewells with raised platforms, rainwater storage for dry days, raised pit latrines for raised homesteads may be considered for immediate applications.</li> <li>■ Floating latrine facility may be further researched for application during floods in these areas</li> </ul>
<b>Development Decision and Ownership</b>	■ The Community and LGI, Upazila/ Union Parishad
<b>Design and Implementation</b>	■ Local Authority, Haor Development Board, DPHE, LGED, and NGOs

#### 6.2.4 Strategies for Barind Areas

<b>Barind Tract Challenges</b>	<ul style="list-style-type: none"> <li>■ Drought prone area with severe water scarcity during 4 – 5 dry months of the year.</li> <li>■ Groundwater level declines during dry season without full recovery during wet season, yet heavy abstraction is done from groundwater source for both domestic and irrigation purposes.</li> <li>■ Surface water sources e.g., canals, ponds, in many cases dry up, and rain water storage has not been given due attention.</li> <li>■ Water dependent sanitation options become unhygienic due to water scarcity.</li> <li>■ A large part of the poor and hardcore poor population cannot afford to have expensive options.</li> </ul>
<b>Strategies for Sustainable Solutions</b>	<ul style="list-style-type: none"> <li>■ Subsurface rainwater recharge, excavation, regeneration and protection of rain fed ponds, excavation of dried up canals and streams, large storage of surface and rain waters for lean period are possible options that need immediate attention and studies for developing a sound multisource water management system for Barind areas.</li> <li>■ Attention is also needed to balanced use of groundwater and surface water with greater emphasis on rain water capture and storage.</li> </ul>

	<ul style="list-style-type: none"> <li>■ Sanitation options that require less water and yet fully hygienic should be promoted; ecological sanitation appears to be more relevant for Barind situation.</li> <li>■ Rigorous campaigns are needed to enlighten people of the benefits of water conservation, use of surface and rain water and eco-sanitation.</li> </ul>
<b>Strategies for Immediate Solutions</b>	<ul style="list-style-type: none"> <li>■ Community water points with appropriate treatment units as needed (arsenic, iron removal of groundwater, filtration of surface water, disinfecting rainwater) may be considered in HtR villages for immediate application.</li> </ul>
<b>Development Decision and Ownership</b>	<ul style="list-style-type: none"> <li>■ The Community and LGI, e.g., Upazila/ Union Parishad</li> </ul>
<b>Design and Implementation</b>	<ul style="list-style-type: none"> <li>■ Local Authority, BWDB, Barind Authority, DPHE and NGOs</li> </ul>

### 6.2.5 Strategies for Hill areas

<b>Challenges of the Hills</b>	<ul style="list-style-type: none"> <li>■ The drinking water and sanitation challenges in the hills results primarily from different geographic, socio-cultural and hydro-geologic conditions.</li> <li>■ Surface water sources, e.g., springs, charra and streams have seasonal fluctuations that exacerbate due climate changes as apparently observed during the past decades.</li> <li>■ These surface water sources, despite subject to heavy pollution, are mostly used for drinking and other purposes by the hill people.</li> <li>■ Groundwater extractions are not successful everywhere due to varying altitude and rocky formation and the water level also fluctuates seasonally.</li> <li>■ Lack of proper sanitation and hygiene knowledge coupled with poverty situation and cultural beliefs has resulted in very low sanitation coverage.</li> </ul>
<b>Strategies for Sustainable Solutions</b>	<ul style="list-style-type: none"> <li>■ Developing water reservoirs at appropriate altitude for capturing and storage of spring and/ or rainwater for distribution to downhill community through small flexible pipe network.</li> <li>■ Infiltration galleries, protected dug wells and tubewells where feasible, should be developed as community water points.</li> </ul>

	<ul style="list-style-type: none"> <li>■ Individual and/ or community eco-toilet facilities are to be promoted, through motivational campaign and demonstration, as a major sanitation option in hard to reach hill areas.</li> <li>■ Twin or multiple off-set pit pour flush latrines with urine diversion may also be profitable for the HtR areas.</li> <li>■ Rigorous campaign among people of different ethnic/ tribal groups on the benefits of safe drinking water, sanitation and hygiene practice, are needed.</li> </ul>
<b>Strategies for Immediate Solutions</b>	<ul style="list-style-type: none"> <li>■ Individual or community RWHS with adequate storage for supplementing dry period requirements, to be built near homesteads.</li> <li>■ Simple or pour flush pit latrines using plastic pan and rings can be promoted as these has been successfully demonstrated in hill areas.</li> </ul>
<b>Development Decision and Ownership</b>	<ul style="list-style-type: none"> <li>■ The Regional and District Hill Councils for CHT, and LGIs for Sylhet and Mymensingh areas with participation of tribal leaders and representatives of local indigenous people</li> </ul>
<b>Design and Implementation</b>	<ul style="list-style-type: none"> <li>■ Local Authorities, DPHE, and NGOs</li> </ul>

### 6.2.6 Strategies for Urban Slums

<b>Challenges of Urban Slums</b>	<ul style="list-style-type: none"> <li>■ Slums in large cities and towns are growing at a rapid pace largely because of migration of people from disaster prone, vulnerable areas to urban centers in search of their livelihoods.</li> <li>■ Absence of appropriate water and sanitation strategies and regulations for slums and squatter settlements.</li> <li>■ Most slums on private or public lands are located on lowlands or wetlands and are faced with severe drainage problems particularly during monsoon.</li> <li>■ Drinking water, sanitation, solid waste management and other basic services remain inaccessible due to gaps in relevant policies and disparity in development plans and strategies.</li> <li>■ Slum dwellers on public lands are deprived of services on the plea of illegal occupation and the private land owners are ignorant despite collecting rents at a much higher rate.</li> <li>■ NGOs undertake pilot projects with objectives of demonstrating</li> </ul>
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	<p>how the quality of life of slum dwellers could be improved through provisions of basic services including that of water and sanitation but are faced with occasional eviction of slums on government lands.</p> <ul style="list-style-type: none"> <li>■ People living in slums are unaware of the ill effects of unsafe water, unhygienic latrines, and improper disposal of solid wastes and consequently suffer from diseases and burdens of health care costs.</li> </ul>
<b>Strategies for Sustainable Solutions</b>	<ul style="list-style-type: none"> <li>■ Formulation and implementation of appropriate policy and strategies for slum water supply and sanitation development.</li> <li>■ All basic services including water and sanitation must be made accessible to slum dwellers irrespective of legal status of land and until they are rehabilitated at suitable locations considering their livelihood opportunities.</li> <li>■ Community water point connection from DWASA supply network and community sanitation blocks managed by CBOs have successfully demonstrated improved slum conditions and such approaches should be mainstreamed in the development plans by urban authorities.</li> <li>■ A nationwide awareness campaign in all slum settlements of the country focusing on the economic gains of having clean, hygienic environmental conditions through access to safe water, sanitation, waste management and other basic services, would be an important step forward.</li> </ul>
<b>Strategies for Immediate Solutions</b>	<ul style="list-style-type: none"> <li>■ Community water points and sanitation blocks to be built and maintained by CBOs with assistance from NGOs and in collaboration with urban utilities</li> </ul>
<b>Development Decision and Ownership</b>	<ul style="list-style-type: none"> <li>■ The Communities through CBOs, Wards of Municipalities/ City Corporations</li> </ul>
<b>Design and Implementation</b>	<ul style="list-style-type: none"> <li>■ CBOs, WASAs/ CCs, DPHE, Paurashavas, LGED and NGOs</li> </ul>

## 7 Sources of Funds for Initial Investments

The followings are possible major sources of funds that can be made available for improving drinking water and sanitation situation in the identified hard to reach areas of Bangladesh.

- Climate fund and/ or GoB fund and/ or funds from ESAs
- Government subsidies are needed as most people living in vulnerable, hard to reach areas are poor and all funds to be utilized for initial investment should be available as grants.
- A separate "Water and Sanitation Fund" should be generated from users' contribution and government's allocation for sanitation and any other local or foreign sources, within the frame of LGI's (UP/City Corporation/ Municipality) accounting system and monitored by community taskforce, for O&M of facilities and future rehabilitation as needed.

### 7.1 Justification of Climate Fund

Allocating climate funds for the development of sustainable, climate resilient drinking water and sanitation infrastructure, particularly in the climate vulnerable, disaster prone hard to reach areas is completely justified.

Among the identified HtR areas, the coastal areas of Bangladesh are subject to salinity intrusion into both surface and groundwater due to both sea level rise and low upstream flow (due to variable precipitation) which have now been well established as impacts of global climate change. Furthermore, coastal areas are subject to recurrent severe cyclonic storms and inundation also due to climate change and are responsible for the damage of drinking water and sanitation infrastructure.

The dynamics of seasonal flooding of char lands (River islands), water level fluctuations of Haor areas are linked to variable stream flow and precipitation that affects the drinking water and sanitation infrastructure. The accelerated growth of urban slums is primarily due to rural to urban migration as a result of river erosion also thought to be linked with climate change impacts. The growing scarcity of water availability in the Barind areas and in the Hills is also to be blamed as the adverse impacts of climate change.

## 8 Implementation strategies

Successful implementation of these strategies for the HtR areas requires appropriate institutional arrangements. The communities and the local authorities (LGIs) will be at the core of decision making for the required development. The community will place its demand for improved services to the local government ministry through the local authority.

The ministry is responsible for accumulating funds from different sources as mentioned in the previous section, and will ask the concerned agency e.g., DPHE or LGED, to conduct required studies, research, survey, design and prepare detailed estimate for the local authority to

implement the work in the field. The local authority will ensure participation of local community in the entire processes of identification, planning, design, implementation, monitoring, and operation and maintenance. The NGOs and other Development Partners will facilitate the local community and the LGLs in awareness building, identification and assessment of needs and in implementation monitoring. Finally, it is extremely important that the Ministry of Local Government take immediate initiatives to prepare and implement a development plan in order to address the very urgent needs of the people of the HtR areas of Bangladesh

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