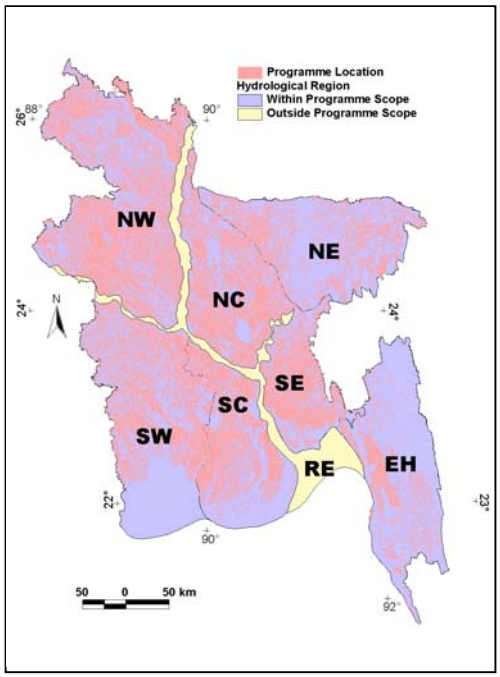
Rural Water Supply and Distribution Systems Ref: **TR 004**

Basic Data

NWMP Sub-sector **Towns and Rural Areas**

Region(s) **National significance**



Relevance to NWPo

Water allocation for domestic use is the first priority under the NWPo. The programme for Rural Areas, under both the NWPo and the National Policy for Safe Water Supply and Sanitation (NPSWSS), aims to address the need for "….safe and affordable drinking water supplies through various means…." for all inhabitants, especially the poor. Policy also mandates that investments to improve and extend water services in the rural areas should be paralleled by continued encouragement of:

(a) community participation, especially the empowerment of women;
(b) private sector involvement; and
(c) effective cost recovery mechanisms for appropriate operations and maintenance.

Purpose of Programme

The projections prepared for the NWMP indicate that the rural population is expected to stabilise in the medium term and decline in the much longer term (i.e. after 2025), based on a predicted acceleration in migration to the cities and towns, especially Dhaka. NWMP projections show a modest increase in the rural population from 102 million in 2000 to nearly 108 million in 2025, before falling steadily to 88 million by 2050. This trend will reduce the pressure for improved service coverage in terms of absolute numbers, but focus more attention on the demand for service quality in terms of improved reliability and direct household access to potable water. At present, service coverage and access to potable water can vary between Thanas and from region to region. NWMP estimates for the whole sector indicate that about 92% of the rural population normally have adequate access to potable water - apart from the very serious arsenic issue (see: Programme TR 002). Shallow HTWs are the dominant water source serving 85% of the rural population; while the other 7% are served by a combination of deep HTWs, Tara pumps and other sources. Current estimates indicate that 57% of the rural population is classified as living in poverty.

The programme for the rural areas assumes that in the medium to long term more communities will seek to improve their access to water services by progressing from shallow HTWs to small DTW based distribution systems with internal and external household connections. This significant development is based on the assumption that rural incomes will improve substantially in real terms and enable rural communities to plan, construct and operate their own systems with the support of the private sector. GoB will support this process through the establishment of an investment fund to provide capital contributions on a grant or soft loan basis.

Programme Outline

Improvements and extensions of rural water services will continue throughout the implementation of the NWMP. The coverage targets by service type are summarised as follows:

Component	Year			
	2000	2005	2010	2025
Population (million)	102.0	104.8	107.1	107.7
Water supply coverage (%)				
Shallow HTW	85	50	15	2
Arsenic filter on HTW/Tara pumps (1)	1	5	8	5
Arsenic removal in households (1)	0	20	5	1
Small DTW based systems	0	10	40	60
Rainwater harvesting	0	2	1	0
Pond sand filters	0	4	2	0
Surface water sources with piped distribution	0	0	2	5
Other options	6	9	27	27
Total	92	100	100	100

Note: (1) Arsenic mitigation is addressed under Programme TR 002.

Financing Arrangements

For effective sustained implementation, the investment programme will require the active and co-ordinated participation of rural community-based organisations with the support of NGOs and the domestic private sector. Indicative financing targets are presented below:

Sector	%
Public (GoB and international development agencies)	5
Private (domestic)	95
Total	100

Rural community organisations and the private sector will need to ensure the availability of adequate funds for:
(a) development of new small DTW based distribution systems;
(b) capital replacement during and after the NWMP period; and
(c) effective operations and maintenance.

In this context, rural communities will need to develop effective pricing and cost recovery mechanisms.

Objectives and Indicators

Objective	Suffix	Indicators/Means of Verification	Due
• Rural water supply programmes prepared	I1	• Signed programme/project documents	2005
• Sustainable operation and maintenance of rural water supply systems	I2	• Frequency of pipe breaks • Response times	2010
• Rural water supply programmes completed	I3	• Programme/project completion reports • Household, community surveys	2025
• 100% of rural population has access to formal water supplies	K	• Survey reports	2025
• Demand for safe and reliable drinking water supplies satisfied in towns and rural areas	D	• % service coverage verified by surveys	2025

Institutional Arrangements

The institutional arrangements for programme implementation are expected to comprise three components as defined by the NWPo and NPSWSS:

(a) Public sector - following the successful engagement of the private sector in the 1990s, the future role for the public sector will largely be to:
   (i) continue the development of a flexible enabling environment;
   (ii) provide appropriate technical support through DPHE;
   (iii) establish an independent monitoring and regulatory framework; (iv) promote education and awareness in the water sector; and
   (iv) provide access to supporting capital funds.

   It will be particularly important for the public sector to ensure that the rural poor and areas of water stress are adequately served.

(b) Community-based participation, with or without NGO involvement - community participation and initiatives will be actively encouraged with investment funds from GoB and the promotion of partnership with the private sector.
(c) Private sector participation - the private sector is expected to play an increasing role in the provision of water services in partnership with rural communities. This will include a full range of services, including: equipment provision; construction; and O&M. This implies that the beneficiaries are willing and able to pay.

The implementation of these institutional developments will need to be carefully formulated and programmed with the full political commitment of GoB and interested stakeholders. In the short to medium term, the Government will also establish an appropriate independent Regulatory Framework to supervise and monitor public and private sector performance in the provision of water services.

References and Documentation

(a) Chapter 7, Development Strategy Report, March 2001
(b) Main references:
(c) National Water Resources Database in WARPO

Linkages

Note: The issue of arsenic contamination in rural water supplies is addressed separately under Programme TR 002 - Arsenic Contamination in Rural Water Supplies.

The sustained development of water supply services for Rural Areas should be closely linked and co-ordinated with other NWMP programmes, namely:
(a) Local Government Needs Assessment for Water Management (ID 001);
(b) Local Government Capacity Building for Water Management (ID 005);
(c) Independent Regulatory Bodies for the Water Supply and Sanitation Service Sector (ID 002);
(d) Support to the Preparation of New Legislation (EE 001);
(e) Field Testing of Participatory Management Models (EE 002);
(f) Water Resources Legislation – Preparation of Supporting Ordinances (EE 003);
(g) Project Preparation Procedures - Guidelines and Manuals (EE 004);

(h) Regulatory and Economic Instruments (EE 005);
(i) Field Testing & Finalisation of Guidelines for Participatory Water Management (EE 006);
(j) Raising Public Awareness in the Wise Use and Management of Water (EE 010);
(k) Private Sector Participation in Water Management (EE 011);
(l) Alternative Financing Methods for Water Management (EE 013);
(m) Rural Arsenic Mitigation (TR 002);
(n) Rural Sanitation (TR 006);
(o) National Clean-up of Existing Industrial Pollution (EA 002);
(p) National Water Quality Monitoring (EA 003); and
(q) Public Awareness Raising and Empowerment in respect of Environmental Issues (EA 010).

The Inventory and Asset Management Plan of the Water and Sanitation Sector (MC 001) is also relevant here.

In addition, planning and implementation should be co-ordinated with the Ministry of Local Government, Rural Development and Co-operatives (MoLGRDC), Department of Public Health Engineering (DPHE), Local Government Engineering Department (LGED), Ministry of Health (MoH), Department of Environment (DoE), WARPO, NGOs and other interested parties.

Risks and Assumptions

There are a number of risks associated with a sustained development programme to improve the provision of safe and reliable water services in Rural Areas. They fall into four categories: technical; institutional; financial; social and environmental.

With the exception of the serious arsenic problem (see: TR 001 and TR 002), the technical risks associated with improved water supply provision will be the increased resources and expertise required to ensure adequate standards of operation and maintenance. In the project preparation and participatory process, rural communities must be given realistic and pragmatic advice on real costs and charges before individual rural communities make a final decision.

The institutional risks mainly relate to the Government's willingness and commitment to provide a flexible environment in which the partnership between rural communities and the private sector can flourish. National policy statements (NWPo and NPSWSS) commit government to a role which is essentially focused on technical assistance, monitoring, independent regulation, and capital funding support.

The financial risks are that the necessary investment resources will not be forthcoming, because of rural income constraints and the possible reluctance of the private sector to support the financing of water distribution systems in rural communities. This situation can be mitigated by the establishment of a Water Fund which would assist rural communities with grants and soft loans, providing the recipient communities also make a specified capital contributions.

The environmental risks for water supply are mainly related to any waste product from the water treatment process and construction operations.. These risks can be mitigated together with a parallel programme to deal with hygienic sanitation facilities.

Assumptions:

- Materials used for construction of new systems will give the assumed working lives.
- Construction of new systems is adequately supervised so as to minimise future operation and maintenance.
- Technical skills will be adequate to enable the efficient and effective O & M of the water systems.
- The operating utility will be able to run the water supply function without political interference.
- Full cost recovery is affordable
- Environmental risks can be successfully mitigated.

Rural Water Supply and Distribution Systems

Ref : **TR 004**

Cluster :	**Towns and Rural Areas**	Region(s) :	**All**
Focus/Foci :	**Water Supplies**	Location :	**Rural Areas Nationwide**
Start Year[1] :	**2001** Duration[2] : **25 year(s)**	Agency(s) Responsible :	**DPHE** **(Lead)** LGIs, DPHE, CBOs (Supporting)

Short Description :

The preamble to NWPo §4.6 of the NWPo recognises that "The rural areas of Bangladesh suffer from a lack of quality drinking water". This situation is worsening due to heavy withdrawals of groundwater (the principle source for most of the rural areas) for irrigation a trend which is exacerbated by agro-chemical and saline pollution of groundwater. Although the rural population is expected to increase relatively slowly over the next 25 years, from 102 million in 2000 to 108 million in 2025, it is nonetheless the GoB's intention to "facilitate the availability of safe and affordable drinking water supplies through various means" (NWPo §4.6.a). It is estimated that 92% of the rural population normally have access to potable water, mainly through shallow HTWs. The thrust of this programme is therefore to improve the quality of water supply services (reliability and access) in areas already served as well as extending the coverage to 100% by 2005.

MIS Links

Cost Calculation :	TR Programme costing.xls	Map :	TR 004 Map.jpg
Disb't Schedule :	TR Programme costing.xls	Description :	TR 004 PgP.doc

Finance

	Costs		Private	Funding (%) GoB	Beneficiaries	Expected by ProgrammeYear
Total Capital[3]	**74,234.00**	MTk	**80%**	**20%**	**0%**	**25**
Ultimate Recurring	**12,884.30**	MTk/yr	**n/a**	**0%**	**100%**	**25**

Date of Data : **31** (dd) **07** (mm) **01** (yy)

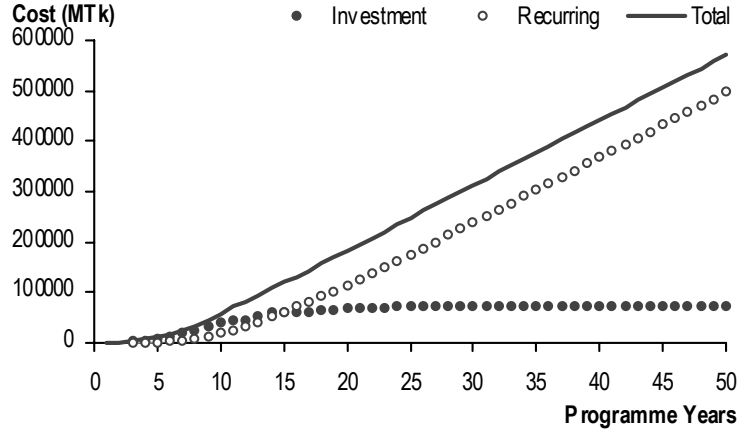
Status : **Identified**

Financial Base Year: **mid-2000**

Planned Expenditure (to date) : **0** MTk

Actual Expenditure[4] (to date) : **0** MTk

Stacked Cumulative Cash Flow Chart



Monitoring

Objective	Indicator	Present Status[5]
• Rural water supply programmes prepared	• Signed programme/project documents	NYD
• Sustainable operation and maintenance of rural water supply systems	• Frequency of pipe breaks • Response times	NYD
• Rural water supply programmes completed	• Programme/project completion reports • Household, community surveys	NYD
• 100% of rural population has access to formal water supplies	• Survey reports	NYD

Notes : 1. Indicative 2. Until commissioning 3. Inclusive of planning, design _supervision 4. For future monitoring purposes and NWMP updates
5. Present Status keys: NYD- Not yet due, IP- In progress, D- Done

National Water Management Plan

Programme Costing Sheet

Programme Ref	**TR 004**
Title	**Rural Water Supply and Distribution Systems**

Assumptions:

Taka/US$	51.000	TA duration	0.0	years	All prices in mid-2000 values
		Investment duration	25.0	years[1]	

Item	Unit	Quantity	Rate US$	Rate Tk'000	Amount TkM	O&M %	O&M/yr TkM
Technical Assistance							
Expatriate consultants (all-in rate)							
Senior National consultants (all-in rate)							
Mid-level National consultants (all-in rate)							
Sub-totals							
Other general TA programme costs							
Specific other TA programme costs							
Total TA Costs							
TA costs for this programme are included in the capital costs							
Investment items - short term							
Open well	ls	na			729.0	*13.9%*	101.3
Mini Tara + arsenic filter in existing HTW	ls	na		costed in programme TR 002			
FM hand pump (local Tara) with new HTW	ls	na			688.0	*13.5%*	92.9
Mini Tara in existing HTW	ls	na			1,152.0	*13.4%*	154.4
Pond sand filter (existing pond)	ls	na			172.0	*26.1%*	44.9
Rainwater harvesting	ls	na			1,614.0	*12.4%*	200.6
Existing HTW +household arsenic removal	ls	na			2,683.0	*89.1%*	2,390.6
Rural mini DTW +IRP+distribution	ls	na			1,654.0	*17.8%*	294.4
Rural mini DTW +distribution	ls	na			2,832.0	*19.0%*	538.1
Investment items - term							
Mini Tara + arsenic filter in existing HTW	ls	na		costed in programme TR 002			
FM hand pump (local Tara) with new HTW	ls	na			1,065.0	*13.5%*	143.8
Mini Tara in existing HTW	ls	na			3,897.0	*13.4%*	522.2
Pond sand filter (existing pond)	ls	na			199.0	*26.1%*	51.9
Rainwater harvesting	ls	na			35.0	*12.4%*	4.3
Rural mini DTW +IRP+distribution	ls	na			3,980.0	*17.8%*	708.4
Rural mini DTW +distribution	ls	na			9,570.0	*19.0%*	1,818.3
Rural piped distribution from SW	ls	na			7,739.0	*11.1%*	859.0
Investment items - short term							
FM hand pump (local Tara) with new HTW	ls	na			11.0	*13.5%*	1.5
Pond sand filter (existing pond)	ls	na			2.0	*26.1%*	0.5
Rainwater harvesting	ls	na			9.0	*12.4%*	1.1
Rural mini DTW +IRP+distribution	ls	na			2,864.0	*17.8%*	509.8
Rural mini DTW +distribution	ls	na			6,305.0	*17.8%*	1,122.3
Rural piped distribution from SW	ls	na			11,717.0	*11.1%*	1,300.6
Rural piped distribution from DTW	ls	na			10,317.0	*11.2%*	1,155.5
Total Investment Items					**69,234.0**	***17.4%***	**12,016.5**

Overall Costs of meeting demands accruing during NWMP timeframe	**69,234.0**	**12,016.5**
Additional NWMP provision to maintain capacity ahead of demand	**5,000.0**	**867.8**
	74,234.0	**12,884.3**

Notes 1 The step-wise approach to investment necessary to achieve and maintain installed capacity ahead of demands may mean that the total investment against +25 year demand is disbursed within the 25 year horizon. However, an additional provision will also be disbursed before the end of the 25 year, in order again to keep capacity ahead of ongoing demand increases.

Rural Water Supplies — **Coverage Targets (%)**

Option	Description	Total Annual Cost (Tk/m^3)	2000	2005	2010	2025	2050
	Total population		102,000,000	104,800,000	107,100,000	107,700,000	88,000,000
	Existing HTWs		85%	50%	15%	2%	0%
N3.1	Open well	5.04	2%	3%	2%	1%	0%
N3.2.1	Mini Tara + arsenic filter in existing HTW	17.00	1%	5%	8%	5%	0%
N3.2.2	FM hand pump (local Tara) with new HTW	1.33	2%	5%	10%	10%	10%
N3.2.3	Mini Tara in existing HTW	2.65	2%	5%	15%	10%	0%
N3.3.1	Pond sand filter (existing pond)	7.31	0%	1%	2%	2%	0%
N3.4	Rainwater harvesting	105.00	0%	1%	1%	1%	0%
N3.5	Existing HTW + Household arsenic removal	25.00	0%	20%	5%	1%	0%
N3.6.1	Rural mini DTW + IRP + distribution	5.12	0%	3%	10%	15%	15%
N3.6.2	Rural mini DTW + distribution	4.02	0%	7%	30%	45%	45%
N3.7	Rural piped distribution from SW	21.88			2%	5%	15%
N3.8	Rural piped distribution from DTW	19.61				3%	15%
			92%	**100%**	**100%**	**100%**	**100%**

Rural Water Supplies — **Coverage Targets - Number of Population**

Option	Description	2000	2005	2010	2025	2050
	Total population	102,000,000	104,800,000	107,100,000	107,700,000	88,000,000
	Existing HTWs	86,700,000	52,400,000	16,065,000	2,154,000	0
N3.1	Open well	2,040,000	3,144,000	2,142,000	1,077,000	0
N3.2.1	Mini Tara + arsenic filter in existing HTW	1,020,000	5,240,000	8,568,000	5,385,000	0
N3.2.2	FM hand pump (local Tara) with new HTW	2,040,000	5,240,000	10,710,000	10,770,000	8,800,000
N3.2.3	Mini Tara in existing HTW	2,040,000	5,240,000	16,065,000	10,770,000	0
N3.3.1	Pond sand filter (existing pond)	102,000	1,048,000	2,142,000	2,154,000	0
N3.4	Rainwater harvesting	0	1,048,000	1,071,000	1,077,000	0
N3.5	Existing HTW + Household arsenic removal	0	20,960,000	5,355,000	1,077,000	0
N3.6.1	Rural mini DTW + IRP + distribution	0	3,144,000	10,710,000	16,155,000	13,200,000
N3.6.2	Rural mini DTW + distribution	0	7,336,000	32,130,000	48,465,000	39,600,000
N3.7	Rural piped distribution from SW	0	0	2,142,000	5,385,000	13,200,000
N3.8	Rural piped distribution from DTW	0	0	0	3,231,000	13,200,000
		93,942,000	104,800,000	107,100,000	107,700,000	88,000,000

Rural Water Supplies — **Incremental Coverage Targets - Number of Population**

Option	Description	2000	2005	2010	2025	2050
	Total population	102,000,000	104,800,000	107,100,000	107,700,000	88,000,000
	Existing HTWs		-34,300,000	-36,335,000	-13,911,000	-2,154,000
N3.1	Open well		1,104,000	-1,002,000	-1,065,000	-1,077,000
N3.2.1	Mini Tara + arsenic filter in existing HTW		4,220,000	3,328,000	-3,183,000	-5,385,000
N3.2.2	FM hand pump (local Tara) with new HTW		3,200,000	5,470,000	60,000	-1,970,000
N3.2.3	Mini Tara in existing HTW		3,200,000	10,825,000	-5,295,000	-10,770,000
N3.3.1	Pond sand filter (existing pond)		946,000	1,094,000	12,000	-2,154,000
N3.4	Rainwater harvesting		1,048,000	23,000	6,000	-1,077,000
N3.5	Existing HTW + Household arsenic removal		20,960,000	-15,605,000	-4,278,000	-1,077,000
N3.6.1	Rural mini DTW + IRP + distribution		3,144,000	7,566,000	5,445,000	-2,955,000
N3.6.2	Rural mini DTW + distribution		7,336,000	24,794,000	16,335,000	-8,865,000
N3.7	Rural piped distribution from SW		0	2,142,000	3,243,000	7,815,000
N3.8	Rural piped distribution from DTW		0	0	3,231,000	9,969,000

Rural Water Supplies — **Incremental Investment Requirements - Number of Population**

Option	Description	2000	2005	2010	2025	2050
	Total population	102,000,000	104,800,000	107,100,000	107,700,000	88,000,000
	Existing HTWs		0	0	0	0
N3.1	Open well		1,104,000	0	0	0
N3.2.1	Mini Tara + arsenic filter in existing HTW		4,220,000	3,328,000	0	0
N3.2.2	FM hand pump (local Tara) with new HTW		3,200,000	5,470,000	60,000	0
N3.2.3	Mini Tara in existing HTW		3,200,000	10,825,000	0	0
N3.3.1	Pond sand filter (existing pond)		946,000	1,094,000	12,000	0
N3.4	Rainwater harvesting		1,048,000	23,000	6,000	0
N3.5	Existing HTW + Household arsenic removal		20,960,000	0	0	0
N3.6.1	Rural mini DTW + IRP + distribution		3,144,000	7,566,000	5,445,000	0
N3.6.2	Rural mini DTW + distribution		7,336,000	24,794,000	16,335,000	0
N3.7	Rural piped distribution from SW		0	2,142,000	3,243,000	7,815,000
N3.8	Rural piped distribution from DTW		0	0	3,231,000	9,969,000
	Total		45,158,000	55,242,000	28,332,000	17,784,000

Rural Water Supplies — **Incremental Investment Requirements - Capital Costs**

Option	Description	Unit Capital Cost Tk/capita	2000	2005	2010	2025	2050
	Total population		102,000,000	104,800,000	107,100,000	107,700,000	88,000,000
				TkM	**TkM**	**TkM**	**TkM**
N3.1	Open well	660		729	0	0	0
N3.2.1	Mini Tara + arsenic filter in existing HTW	157		663	522	0	0
N3.2.2	FM hand pump (local Tara) with new HTW	180		688	1,065	11	0
N3.2.3	Mini Tara in existing HTW	360		1,152	3,897	0	0
N3.3.1	Pond sand filter (existing pond)	182		172	199	2	0
N3.4	Rainwater harvesting	1,540		1,614	35	9	0
N3.5	Existing HTW + Household arsenic removal	128		2,683	0	0	0
N3.6.1	Rural mini DTW + IRP + distribution	526		1,654	3,980	2,864	0
N3.6.2	Rural mini DTW + distribution	386		2,832	9,570	6,305	0
N3.7	Rural piped distribution from SW	3,613		0	7,739	11,717	28,236
N3.8	Rural piped distribution from DTW	3,193		0	0	10,317	31,831
	Total Incremental Capital Cost			**12,185**	**27,008**	**31,225**	**60,067**
	Total Cumulative Capital Cost			**12,185**	**39,193**	**70,419**	**130,485**

Note: Considering that Options N3.2.1, N3.3.1 and N3.4 provides water for drinking only in arsenic affected areas and an HTW may not be existing closeby to meet the other water needs, extra number of Option N3.2.2 is provided (equal to 10% of the combined coverage of N3.2.1, N3.3.1 and N3.4) to take care of any shortfalls.