People's Republic of Bangladesh

Data Collection Study on Regional Development in Southeastern Bangladesh

Final Report

March 2012

JAPAN INTERNATIONAL COOPERATION AGENCY

PADECO Co., Ltd.



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ADB	Asian Development Bank		
AL	Awami League		
AusAid	Australian Agency for International Development		
BARI	Bangladesh Agricultural Research Institute		
BCR	CHT Baseline Census Report		
BCS	Bangladesh Civil Service		
BNP	Bangladesh Nationalist Party		
BRDB	Bangladesh Rural Development Board		
BSRTI	Bangladesh Sericulture Research and Training Institute		
CHT	Chittagong Hill Tracts		
CHTDB	Chittagong Hill Tracts Development Board		
CHTDF	Chittagong Hill Tracts Development Facility		
CIDA	Canadian International Development Agency		
СХВ	Cox's Bazar		
DAE	Department of Agricultural Extension		
DANIDA	Danish International Development Agency		
DC	Deputy Commissioner		
DPHE	Department of Public Health Engineering		
DTW	Deep tube-well		
DYD	Department of Youth Development		
ECA	Ecologically Critical Area		
EPI	Expanded Programme on Immunization		
EU	European Union		
GFS	Gravity flow System		
GOB	Government of Bangladesh		
HDC	Hill District Council		
HYV	High Yielding Varieties		
ICDP	Integrated Community Development Project		
ILO	International Labor Organization		
IOM	International Organization for Migration		
ЛСА	Japan International Cooperation Agency		

Abbreviations and Acronyms

KDA	Kaptai Dam Authority		
LGD	Local Government Division		
LGED	Local Government Engineering Department		
LGSP	Local Governance Support Project		
MDGs	Millennium Development Goals		
MICS	Multiple Indicator Cluster Survey		
MoCHTA	Ministry of Chittagong Hill Tracts Affairs		
MoLGRDC	Ministry of Local Government, Rural Development, and Cooperatives		
NBDs	Nation Building Departments		
NGO	Non-Governmental Organizations		
PCSJJ	Parbatya Chattagram Jana Samhati Samity		
PDB	Power Development Board		
PDC	Para Development Committee		
PRDP 2	Participatory Rural Development Project 2		
RC	Regional Council		
SAE	Sub-Assistant Engineer		
SBC	Socio-Economic Baseline Survey of Chittagong Hill Tracts		
STW	Shallow tube-well		
UDCCM	Union Development Coordination Committee Meeting		
UNDP	United Nations Development Programme		
UNFPA	United Nations Population Fund		
UNHCR	United Nations High Commissioner for Refugees		
UNICEF	United Nations Children's Fund		
UNO	Upazila Nirbahi Officer		
UPDF	United Peoples Democratic Front		
USAID	United States Agency for International Development		
WB	World Bank		
WFP	World Food Programme		
WSC	Women Service Center		
WSP	Water & Sanitation Programme		

1. Outline of the Study

1.1 Background of the Study

Bangladesh has achieved significant economic growth in 1990s but poverty alleviation is still the most important concern of the Government of Bangladesh (GOB). The northwestern part, southwestern part, and southeastern part of Bangladesh especially suffer from poverty compared to the other areas as shown in Figure 1-1. GOB has addressed the problem of underdeveloped areas and aims at equilibrium development as one of the most important issues in the 6th Five Year Plan. It is considered that the development needs for the underdeveloped areas are high and urgent.



Source: Updating Poverty Maps of Bangladesh, Bangladesh Bureau of Statistics, World Bank, World Food Programme, 2005

Figure 1-1: Poverty Map

Chittagong Hill Tracts (CHT) and Cox's Bazar (CXB) are the areas where the attention for regional development is required in southeastern Bangladesh. Among the development needs in CHT & CXB, one of the urgent issues is access to safe drinking water because the area is also underdeveloped in terms of safe water access as shown in Figure 1-2.



2009 (UNICEF)

Figure 1-2: Population Ratio without Safe Water Access

Comprehensive analysis is needed to upgrade the basic needs and utilize the potential of the area under such circumstances. For that analysis, basic data collection is required considering the area specific situations.

1.2 Objectives of the Study

Objectives of the Study are as follows:

- To collect basic data in the area in terms of regional development, industrial development, and safe water development
- To analyze the data for the regional development

1.3 Study Area and Main Organization Visited

The Study area consists of 4 districts in southeastern Bangladesh, namely, Khagrachhari district, Rangamati district, Bandarban district, and Cox's Bazar district, which are located in Chittagong Division of the southeastern Bangladesh as shown in Table 1-1.

				Municipalities/
District	Upazila	Union	Village	City Corporation
Bandarban	7	29	1,501	1
Khagrachhari	8	34	1,581	1
Rangamati	10	48	1,382	1
Chittagong	26	194	1,310	7
Cox's Bazar	7	67	984	3
Brahmanbaria	8	98	1,331	4
Chandpur	8	87	1,237	6
Comilla	13	179	3,638	5
Feni	5	45	570	2
Lakshmipur	4	50	539	3
Noakhali	6	83	987	5

Table 1-1: Chittagong Division

Source: Statistical Yearbook of Bangladesh 2009

Main organizations visited are:

- Ministry of Chittagong Hill Tracts Affairs
- Department of Public Health Engineering
- Chittagong Hill Tracts Regional Council
- Chittagong Hill Tracts Development Board
- Hill District Councils
- District Council in CXB
- Deputy Commissioner Office in each district
- Nation Building Departments in each district
- Other relevant organizations

1.4 Methodology of the Study

The study was conducted by compiling the statistical data and qualitative data collected by documents, interviews, rapid rural appraisals, and water quality test on the spot. The results were summarized in the institutional profile, district profile, community profile, local industry profile, and safe drinking water profile. Accordingly, the present situation on regional development and possible cooperation framework were analyzed based on the results. Alignment with the existing development endeavor and other JICA technical cooperation projects was taken into consideration during the study for efficient and effective outcome.

The parameters of water quality test are shown in Table 1-2.

	Water quality test item	Test method
1	General Bacteria	Test paper
2	Coliform Bacteria	Test paper
3	Nitrate Nitrogen	Pack-test
4	Nitrite Nitrogen	Pack-test
5	Ammonia Nitrogen	Pack-test
6	Iron	Pack-test
7	Manganese	Pack-test
8	Arsenic	Field kit (hach)
9	рН	pH meter
10	Electrical conductivity	EC meter
11	Oxidation-reduction Potential	ORP meter
12	Taste	Taste
13	Odor	Smell
14	Chromaticity	Eye check
15	Turbidity	Eye check
16	Water temperature	Thermometer

Table 1-2	Parameter	for Water	Quality Test
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The study team is as follows:

(1)	Team Leader/Regional development:	Yojiro Fujiwara
(2)	Industrial development:	Taisuke Tokuoka
(3)	Safe water development:	Masahide Shimamura

1.5 Schedule of the Field Study

The schedule of the filed study is as follows:

	Date	Work
1	January 21 to 25, 2012	Meeting with relevant organizations
		Data collection and analysis in Dhaka
2	January 26 to 31, 2012	Meeting with relevant organizations
		Data collection and analysis in Khagrachhari district
3	February 1 to 6, 2012	Meeting with relevant organizations
		Data collection and analysis in Rangamati district
4	February 7 to 11, 2012	Meeting with relevant organizations
		Data collection and analysis in Bandarban district
5	February 12 to 16, 2012	Meeting with relevant organizations
		Data collection and analysis in Cox's Bazar district
6	February 17 to 20, 2012	Data compilation and analysis in Dhaka
		Reporting to JICA Bangladesh Office and Embassy of Japan

2. Institutional Profile

2.1 Administrative Set-Up

Bangladesh is divided into 7 divisions, 64 districts, 508 upazilas, and 4,466 unions all over the country. There are District Councils in district, Upazila Parishads in upazila, and Union Parishads in union under the Ministry of Local Government, Rural Development, and Cooperatives (MoLGRFC). Local elections at district level have not been held yet but District Administrators have been appointed according to District Council Act 2000. In CHT, there are Hill District Councils in each district according to District Council Act 1989 (amended in 1998) under the Ministry of Chittagong Hill Tracts Affairs (MoCHTA). Local elections have not been held for newly formed Hill District Councils. Besides Hill District Councils, there are CHT Regional Council (CHTRC) and CHT Development Board (CHTDB) under MoCHTA. In addition to that, there is a traditional local administrative set-up of Circle chief, Headman, and Karbari/Sadar in CHT. Government officers have been appointed to both District Councils and Hill District Councils as Chief Executive Officers, who are administrative cadre of Bangladesh Civil Service.

Parallel to local government institutions, officers of central government are appointed to divisions, districts, and upazilas as Divisional Commissioner, Deputy Commissioner, and Upazila Nirbahi Officer. Their main roles are to maintain law and order and coordinate development work in plain areas of Bangladesh. In CHT, the main role of them is to maintain law and order, and Hill District Councils take the role of coordination of development work.

Public services are delivered by Nation Building Departments (NBDs) like Department of Agricultural Extension. NBDs have its own offices in division, district, and upazila levels. In CHT, however, a total of 33 broad areas of authority were designated to be transferred to Hill District Councils based on the Peace Accord in December 1997. Up to now 19, 21 and 20 government departments/agencies have been transferred respectively to the Hill District Councils of Khagrachhari, Rangamati and Bandarban.

Administrative set-up is shown in Figure below.



Source: Prepared by the Study Team

Figure 2-1: Administrative Set-Up

2.2 Chittagong Hill Tracts

CHT is hilly area with the border to India and Myanmar. 11 or more ethnic groups live in the area with different socio economic culture than flood area. Although there has long been disputes regarding the ethnic groups and Bengali settlers, CHT Peace Accord has been agreed in 1997. It is recognized that the Peace Accord is the basis of the development in the CHT region although some issues like land dispute are not fully resolved.

Land Administration

All the lands in the CHT are classified under the category of (1) Forests, (2) Paddy land, (3) Fringe land, (4) Grove land, (5) Private land, and (6) Village commons. Forests are sub-categorized into Reserve Forests, Protected Forests, and Unclassified State Forests.

Land of CHT is administered/governed by a number of laws. These are:

- a. CHT Regulations 1900
- b. Forest Act, 1927 (as amended in 2003)
- c. Headmen Rules, 1936
- d. Bazar Fund Rules, 1936
- e. CHT (Land Acquisition) Regulation, 1958
- f. Forest Transit Rule, 1974
- g. Land Khatian Ordinance, 1984
- h. Land Appeal Board Rules, 1989
- i. CHT Accord 1997
- j. HDCs (Bandarban, Rangamati and Khagrachhari) Act, 1998
- k. CHT Regional Council Act, 1998
- l. CHT Land Commission Act, 2001

Major Institutions for CHT are as follows:

Ministry of Chittagong Hill Tracts Affairs (MoCHTA)

With the signing of the Peace Accord, most of the activities of the former Special Affairs Division have been turned into a full cabinet level body with the title of Ministry of Chittagong Hill Tracts Affairs. MoCHTA has the responsibility of overseeing the overall policy formulation and planning and implementation of administrative and development activities for the benefit of the region. Unlike other ministries, the MoCHTA has an Advisory Committee, comprising of the following:

- 1. Minister in charge of the MoCHTA Chairman
- 2. Chairman / representative, RC
- 3. Chairmen / representatives, HDCs (Rangamati, Bandarban and Khagrachhari)
- 4. MPs (Rangamati, Bandarban and Khagrachhari)
- 5. Circle Chief, Rangamati (Chakma Raja)
- 6. Circle Chief, Bandarban (Bohmang Raja)
- 7. Circle Chief, Khagrachhari (Mong Raja)

8. Three representatives of the Bengali Community, one from each district, nominated by the Government (MoCHTA)

Regional Council (RC)

Regional Council was established by the Chittagong Hill Tracts Regional Council Act, 1998. Its functions are overall supervision and coordination of development activities and general

administration in CHT. The composition of RC membership is as follows, with the condition that its Chairman belong to one of the "tribal" communities of the region:

a. Chairman – 01
b. Tribal member – 12
c. Non-tribal member – 06
d. Tribal women – 02
e. Non-tribal woman – 01
f. Chairmen of three Hill Districts – 03 (ex-officio)
Total – 25

The representation of the various tribal groups is as follows:

a. Chakma – 05
b. Marma – 03
c. Tripura – 02
d. Mro (Murang) and Tanchangya – 01
e. Lushai, Bawm, Pangkho, Khumi, Kheyang and Chak – 01

Hill District Council (HDC)

As a result of the Peace Accord the three former Hill District Local Government Councils have been re-named as Hill District Councils (HDCs) and the relevant Act of 1989 was amended. Each HDC is composed of 30 members. The Chairman and the members are to be directly elected by universal suffrage though these elections (last held in 1989) have been postponed since the signing of the Peace Accord. Along with their administrative roles, the HDCs are mandated to be the principal organs for implementation of development projects.

Deputy Commissioner (DC) Office

The roles of DC are focused primarily on government administrative and law and order matters. DC does not have active role on development activities as a result of the institutional arrangements set out by the Peace Accord.

Chittagong Hill Tracts Development Board (CHTDB)

The CHTDB was established as an autonomous body in 1976 by an Ordinance for undertaking developmental activities in the CHT region. As per the Peace Accord and the CHT Regional Council Act, it is supposed to become the institutional wing for development work under the supervision of Regional Council.

Local NGOs

In recent years, various local NGOs have emerged as viable institutions for extending developmental services to the people of the region. But most of these NGOs are still new, small in size and still in a phase of gaining development and management experience.

Traditional Institutions and Leaders

Alongside MoCHTA, RC and HDCs, the traditional institutions and leadership are to play a special role in terms of land and revenue matters in the CHT. There are three circles with Circle Chiefs, namely, Mong Circle, Chakma Circle, and Bohmang Circle. Under Circle Chiefs, there are Headmen at Muza level and Karbari at Para level. Chiefs (and to a lesser degree, also the Headmen) have the judicial authority of trying any cases that are not of a criminal nature, with the power of a magistrate.

UNDP has been assisting for the development of CHT and formulated Chittagong Hill Tracts Development Facility (CHTDF) to coordinate the development activities.

Major development projects are as follows:

Promotion of Development and Confidence Building in the CHT

Implementation agencies: MoCHTA/CHTDF

Development partners: EU, CIDA, DANIDA, UNDP, etc.

Budget: US\$160 million (2003 to 2013)

Main activities: Main activities are community empowerment, economic development, primary education, health, capacity building of local government, confidence building. More than 3,000 Para Development Committee (PDC) have been formulated. It is planned to utilize Union Development Coordination Committee Meeting (UDCCM) for linkage between government agencies and villagers.

Chittagong Hill Tracts Rural Development Project Phase II

Implementation agencies: MoCHTA, HDCs, Local Government Engineering Department (LGED)

Development partners: Asian Development Bank

Budget: US\$65 million (7 years from 2012)

Main activities: Main activities are construction of road and rural infrastructure, marketing support, construction of community infrastructure, capacity building. Watershed management is to be piloted in 6 areas.

Integrated Community Development Project

Implementation agencies: CHTDB

Development partners: UNICEF

Budget: 1,790 million TK (1996 to 2011)

Phase 1 was from 1985 to 1995. Phase 2 was from 1996 to 2011.

Phase 3 is expected to be approved considering the importance of the project.

Main activities: Main activities are education, sanitation and health. About 3,500 Para Centres were constructed where public services are delivered. Para workers are

recruited from the corresponding para. 95% of para workers are women.

2.3 Cox's Bazar

CXB is the most popular tourist spot known as having the longest beach in the world and different socio economic culture than flood area which attracts tourists. But the area is cyclone-prone and underdeveloped than other areas. The administrative set-up is same as other areas and DC has the role of coordination of development activities.

LGED implements two projects on regional development. Improved Rural Infrastructure Development Project is a nation-wide project including CXB for 5 years from 2010/11. 330 million TK was allocated for 2 years in CXB. Union Connecting Road Improvement Project in Greater Chittagong District is for 4 years from 2009/10 with budget of 3,000 TK. 130 TK million was allocated for 2 years in CXB.

CARE implements Standing Household Ability to Respond to Development Opportunity II financed by GOB and USAID. The budget is US\$130 million for 11 districts including CXB which are identified as most vulnerable area with the duration of 2010 to 2015. Ukhia upazila and Teknaf upazila are the target upazilas covering 6 unions, 72 villages, and 20,000 households.

The project is implemented with 12 government agencies like Department of Agricultural Extension, Department of Public Health Engineering, utilizing local NGOs with overall supervision by DC. Main activities are agriculture and income generation, sanitation, health and nutrition, empowerment of women and children, capacity development, disaster management.

UNICEF implements Convergence Programme for 7 districts including CXB. Main activities are on good governance, capacity development of public service provider and villagers, improving public service delivery. Focused public services are regarding women and children which are provided by Department of Public Health Engineering, Department of Primary Education and so on. NGOs like Child Protection and BRAC are also involved in the programme utilizing 69 Community Based Organizations (CBOs). The budget for CXB in 2011 is US\$2.5 million.

UNFPA works on safe childbirth in all over the country including CXB with Department of Health and Family Planning, Department of Primary Education, Department of Youth Development, Department of Women and Children Affairs, and so on. The 8th country programme will be starting in 2012.

WFP works on food and nutrition in all over the country including CXB. Main activities are improving mother and child nutrition, school feeding, and enhancing food security.

UNHCR works for Rohingya refugees in 2 camps in Ukhia upazila and Teknaf upazila with other UN agencies in collaboration with NGOs. The budget for 2012 is US\$14 million.

3. District and Community Profile

3.1 District Profile

3.1.1 Historical Background

According to the "Bangladesh District Gazetteer, Chittagong Hill Tracts,"the history of Chittagong Hill Tracts (CHT) ascended to the 6th century. Then, Arakanese and Tripra scrambled the territories until it came under contol of the sultanate in the 14th century. During the Sultan era, Chakma Circle came to be an important actor in CHT, and contested with Arakanese and Tripra for sovereignty over CHT. The area was ruled by Mugal since 1666, then it was alienated from Mugal to the East Indian Company in 1760. The first Deputy Commissioner was delegated to CHT, and direct control by the colonial government was established. In the colonial era, CHT was granted limited autonomy. After the British colonial government, Pakistani government repealed autonomy of CHT. The conflict was started to resist against the policy to integrate CHT into the Bengali society. The Peace Accord was concluded between the Bangladeshi government and Jana Samhati Samity (JSS) in 1997 for establishment of a new regime in CHT.

3.1.2 Natural Environment

(1) Rainfall

Figure 3-1 shows annual rainfall from 2001 to 2010. Decline of annual rainfall is not identifiable.



Source: 2010 Agriculture Statistics of Bangladesh

Figure 3-1: Annual Rainfall (2001 to 2010) (mm)

Figure 3-2 shows monthly rainfall and minimum and maximum temperatures in 2010. Most of the rainfall was seen from May to October.



Figure 3-2: Monthly Rainfall and Temperatures in 2010

3.1.3 Population

According to the Population Census in 2008/09, the population density in Bangladesh is 977 per square kilometer. As is shown in Table 3-1, the population density in CHT is very low. The population growth rate in Bangladesh is 1.26%, while the rates in CHT districts are more than 2%. It is assumed that contributing factors of population growth are not only natural growth but also migration from plain land.

	Khagrachari	Rangamati	Bandarban	Cox's Bazar
Total	525,664	508,182	298,120	1,773,709
Population Density*				
2008/09 (per Sq. Km)	195	83	67	712
Population Growth				
Rate (%) 2001	4.38	2.39	2.60	2.25
Traibal Population**	192,647	257,679	142,651	25,493
Population by Religion				
Muslim	228,753	187,132	147,062	1,648,211
Hindu	86,351	26,944	10,796	87,123
Buddist	3,745	8,781	28,546	1,722
Christian	206,473	284,906	103,997	35,737
Other	342	419	7,719	916

Table 3-1: Population in CHT and Cox's Bazar

Source: Population Census-2001, Community Series, Zila: Khagrachhari, Rangamati, Bandarban and Cox's Bazar; *Bangladesh Economic Review, "Socio-economic indicators of Bangladesh"; **Statistical Yearbook of Banlgadesh-2010.

Tribal population in Southeastern Bangladesh is higher than other parts. Figure 3-3 shows the percentage of tribal people in each district. Around 30 to 40% of the population is tribal in CHT, while only 1% is tribal in Cox's Bazar.



Source: Produced based on Population Census-2001, Community Series, Zila: Khagrachhari, Rangamati, Bandarban and Cox's Bazar by the research team.

Figure 3-3: Tribal Population in CHT and Cox's Bazar

As is common in Bangladesh, the majority of Bengal is Muslim. The tribal population usually consists of non-Muslims, such as Hindu, Buddhist and Christian. As shown below, population percentage by religion demonstrates distribution of Bengali population and the tribal population.



Source: Population Census-2001, Community Series, Zila: Khagrachhari, Rangamati, Bandarban and Cox's Bazarby the research team.

Figure 3-4: Population by Religion in Southeastern Bangladesh

Distribution of tribal populations is diverse in CHT. As shown in Table 3-2, Chakma and Tripra are the main tribes in Khagrachhari while Chakma account for about 50% of the population in Rangamati, and Marma follows it. In Bandarban, Marma and Mro are the majority.

Ethnicity	Khagrachhari	Rangamati	Bandarban
Chakma	28.67	47.25	1.1
Marma	11.5	11.62	26.15
Tanchanga	0.03	5.15	4.02
Tripura	15.14	1.73	6.07
Bom	0	0.06	3.86
Khang	0	0.25	0.73
Pangkhoa	0	0.33	0.03
Mro			11.08
Khumi	0	0.01	0.6
Kuki	0	0.01	0.01
Lusai	0	0.08	0.02
Santhal	0.13	0.01	
Chak	0	0.01	0.89
Bengalis	44.5	33.43	45.43
Rakhain	0.02	0.03	0.01
Other	0.01	0.03	0.01
Total	100	100	100
Respondents (N)	95,995	90,895	47,845

Table 3-2: Rate of Population by Tribe in CHT

Source: CHT Baseline Census Report 2010, Water Aid.

3.1.4 Economic Situation

The industry sector has been dramatically growing in Bangladesh in recent years. The share of industry was 17.31% in 1980/81, and it grew up to 29.73% by 2008/09. On the other hand, the share of agriculture as the key sector in Bangladesh decreased from 33.07% in 1980/81 to 20.6% in 2008/09. However, it is said in the Bangladesh Economic Review 2009" that 36.4% of households engage in agricultural work in urban areas, and 46% in rural areas. Since industry and service sectors are based on agriculture in many ways, it is said that agriculture is still the basic sector in Bangladesh.

The macro economy of southeastern part of Bangladesh is structurally the same as Bangladesh as a whole. As it can be seen in Tables 3-3, 3-4 and Figure 3-5, service sector is predominant over others in Cox'Bazar and Bandarban. Agriculture is the leading sector only in Khagrachhari. Though the structure of macro economy is the same as Bandarban and Cox's Bazar, the growth rate of Rangamati is minus due to the minus trend in agriculture and industry sectors. The growth trend of Cox's Bazar is hightly upward compared to CHT area. It is considered that rapid tourism growth contribute the trend in Cox's Bazar.

	Kagrachhari	Rangamati	Bandarban	Cox's Bazar	Chittagong	National
Agriculture	146	39	19	233	421	11,014
Crop	22	14	8	75	195	6,881
Livestock	10	8	4	18	54	1,445
Fishery	0	10	1	132	152	2,237
Forestry	7	8	5	8	20	958
Industry	28	32	20	203	1,869	16,674
Service	97	116	66	383	2,581	31,356

 Table 3-3: GDP by Sector in Southeastern Bangladesh 2005/06

Source: Deb, Hoque, Khaled and Bairagi, Paper presented at the Dialogue on "Addressing Regional Inequalities: Policy Options and Strategies" held on 28 February 2008 at the CIRDAP Auditorium; organized by the Centre for Policy Dialogue (CPD).

				-		
	Kagrachhari	Rangamati	Bandarban	Cox's Bazar	Chittagong	National
1995/96	105	263	93	564	3,055	39,068
1999/00	124	196	104	660	3,543	45,447
2005/06	163	187	105	820	4,871	59,748
Growth Rate						
(1995/96 - 2005/06)	55.0	-28.9	13.2	45.3	59.4	52.9

Table 3-4: GDP and Growth Rate in Southeastern Bangladesh 1995/96–2005/06

Source: Deb, Hoque, Khaled and Bairagi, Paper presented at the Dialogue on "Addressing Regional Inequalities: Policy Options and Strategies" held on 28 February 2008 at the CIRDAP Auditorium; organized by the Centre for Policy Dialogue (CPD).



Source: Prepared by the Study Team based on Deb, Hoque, Khaled and Bairagi, Paper presented at the Dialogue on "Addressing Regional Inequalities: Policy Options and Strategies" held on 28 February 2008 at the CIRDAP Auditorium; organized by the Centre for Policy Dialogue (CPD).

Figure 3-5: GDP and Growth Rate in Southeastern Bangladesh

Table 3-5: GDP Growth Rate by Sector in Southeastern Bangladesh
1995/96–2005/06

	Kagrachhari	Rangamati	Bandarban	Cox's Bazar	Chittagong	National
Agriculture	8.6	-8.3	-8.0	0.2	1.8	1.1
Industry	5.4	-2.7	5.4	5.1	5.3	5.2
Service	6.4	3.2	2.8	5.1	4.6	5.0
Tital GDP	7.5	-1.9	0.7	3.4	4.6	4.2

Source: Deb, Hoque, Khaled and Bairagi, Paper presented at the Dialogue on "Addressing Regional Inequalities: Policy Options and Strategies" held on 28 February 2008 at the CIRDAP Auditorium; organized by the Centre for Policy Dialogue (CPD).

It is surmised from the above tables that agriculture is the bottleneck of the economy in southeastern Bangladesh. When we compare the structural macroeconomic trend with occupational structure in CHT (see Table 3-6), it is demonstrated that around half of the occupation is shared by agriculture related work but the growth of the agriculture sector is nevertheless in a recession except in Khagrachhari. It is presumably said that the livelihood of the majority are disadvantaged by the economic trend for the 10 years shown in the above tables.

Occurrentian	Band	arban	Khagrachhari		Rangamati	
Occupation	Male	Female	Male	Female	Male	Female
Housewife	0	0.23	0	5.17	0	5.5
Unemployed	0.16	1.14	0.32	2.43	0.13	0.36
Farmer	57.07	41.65	37.63	25.84	61.17	45.91
Agri. labourer/sharecropper	7.87	8.92	7.9	3.76	3.31	5.58
Fisherman	0.1	0	0.04	0.08	1.61	0.87
Livestock/poultry farming	0.04	0	0.06	0.23	0.07	0.36
Skilled labourer	0.09	0	0.29	0.31	0.19	0.07
Technical labourer	0.15	0	0.47	0.16	0.19	0.14
Day labourer	16.36	29.29	32.31	41.43	11.08	23.75
Salaried job	6.65	7.55	5.52	1.96	9.09	6.44
Rickshaw/van/ transport	1.22	0.69	1.27	0.16	0.41	0.22
Service worker	0.08	0.23	0.3	0.23	0.1	0.07
Sanitary business	0.15	0.46	0.02	0.08	0.04	0.07
Other business	9.23	4.58	10.37	4.31	8.74	4.78
Handicraft/ tailoring	0.12	1.83	0.12	0.39	0.14	0.43
Mate servant	0.03	0.46	0.05	1.72	0.03	0.58
Retired person/Old age/disabled	0.3	2.52	1.08	8.69	0.73	2.61
Begging	0.02	0.23	0.04	0.39	0.03	0.36
Other	0.36	0.23	2.17	2.66	2.93	1.88
Total	100	100	100	100	100	100
Respondents	47,408	437	94,718	1,277	89,514	1,381

Table 3-6: Popu	lation Ratio	by Occ	upation in	CHT
				••••

Source: CHT Baseline Census Report 2010, Water Aid, p19.

The structural tendency in the macro economy was realized by field survey to a certain degree. In CHT districts, agriculture was given high priority in development, while the industry sector was not recognized as an important sector in spite of the share in the economy. Since improvement in basic infrastructures such as electricity, road and water supply is a prerequisite condition for industries, mid-term to long-term plans will be required for industrial development.

Growth in the service sector is a common trend in southeastern Bangladesh. According to "CHT Regional Plan" prepared by ADB in 2001, issuance of business license increased from 288 in 1997/98 to 588 in 1999/00. It also indicates that construction and transportation are the growing sector. According to interviews from different sources, the study team believes that tourism stimulates those sectors.

3.1.5 Social Situation

In this chapter, we review some important statistics in health, education and gender in southeastern Bangladesh. We also describe achievements in Millennium Development Goals (MDGs) focusing on the points we pick up in the three sectors.

Health Sector

According to statistics shown in the "Multiple Indicator Cluster Survey 2009" published by UNICEF, infant mortality rate in Khagrachhari, Bandarban and Cox's Bazar is comparatively higher than the national average (see Table 3-7). Similarly, under 5 mortality rates in southeastern region in general are also higher than the national average except Rangamati.

	Kagrachhari	Rangamati	Bandarban	Cox's Bazar	Chittagong	National
Infant Mortality Rate	49	36	63	54	40	41
Under 5 Mortality Rate	63	45	85	72	50	54

Table 3-7: Infant and Under 5 Mortality Rate in Southeastern Region

Source: Multiple Indicator Cluster Survey 2009, Volume II: Chittagong Division

The "CHT Regional Development plan" claims that malaria and diarrhea are major diseases in CHT.

It also notes that they have lack of manpower for medical services. According to the hearing from Civil Surgeon in Khagrachhari, it is said that only 42 first class medical officers are appointed out of 127, and second class are only two out of six. On the other hand, 521 third class and 195 fourth class officers are recruited by the Hill District Council for the total posts of 571 and 203 respectively. It proves that disposition by the central government is the challenge of medical services in CHT.

It seems that certain number of community health centers is established, but outreach of the services is limited in rural areas.

Education Sector

Generally speaking, eucation sector in southeastern region is underdeveloped. Table 3-8 shows that attendance rate in pre-school is higher in CHT, but the rates in both primary and secondary levels are lower than the national average.

Indicators	Khagrachhari	Rangamati	Bandarban	Cox's Bazar	Chittagong	National
Pre-school Attendance Rate						
(%)	38.5	40.8	29.5	19.0	25.8	22.9
Net Attendance Rate in						
Primary School (%)	79.4	75.0	60.6	70.0	83.9	81.3
Net Attendance Rate in						
Secondary School (%)	41.6	41.7	28.1	31.2	48.8	49.0
Adult Literacy Rate of						
Population for All Age (%)	42.2	41.8	28.0	28.9	54.9	45.3

Table 3-8: Attendance Rate in Secondary School and Adult Literacy Rate

Source: Multiple Indicator Cluster Survey 2009 Volume II: Chittagong Division

As attendance rate in schools, adult literacy is lower than the national average in southeastern districts. The rate in Bandarban and Cox's Bazar are remarkably low. According to interviews at the community level, the hilly geographic feature and scattered settlement pattern in CHT prevent people from sending their children to schools. Because of the reasons for low rates in school attendance and adult literacy, the demand of boarding school was very high.

Gender

Table 3-9 shows indicators related to gender compiled in the "Multiple Indicator Cluster Survey." It is recognizable in the Gender Parity Index (GPI) for primary schools in general that net attendance rate of female student against the rate of male is lower than national average in the southeastern region except Bandarban. The same tendency is observed in secondary schools except Cox's Bazar.

Indicators	Khagrachhari	Rangamati	Bandarban	Cox's Bazar	Chittagong	National
Gender Parity Index (GPI)						
for Primary School (NAR)	1.01	1.02	1.04	1.02	1.02	1.03
Gender Parity Index (GPI)						
for Secondary School						
(NAR)	1.06	0.98	1.02	1.38	1.07	1.17

Source: Multiple Indicator Cluster Survey 2009 Volume II, Chittagong Division

Labor participatory rate can serve as an indicator to assess the situation of gender balance in the society. Table 3-10 shows the participation rate of the economically active population in the southeastern region. The national average of the participatory rate is relatively lower than districts in the southeastern region except Khagrachhari. Generally speaking, female labor participatory rate is lower than male in Muslim society. Since CHT consists of tribal people whose religions are non-Muslim, religious background could be the reason for high female labor participation. However, interestingly female labor participatory rates are higher in Cox's Bazar and Bandarban where Muslim population is higher than other districts in the southeastern region. Because these two districts have higher poverty rates compared to other CHT districts, poverty would be another factor for high female labor participatory rate.

Table 3-10: Economically	Active Population and	Participation Rate
--------------------------	-----------------------	--------------------

	Khagrachhari	Rangamati	Bandarban	Cox's Bazar	Chittagong	National
Population +15						
Total	303	340	183	1,200	5,063	84,586
Male	157	175	95	633	2,574	43,006
Female	146	165	89	568	2,489	41,580
Economically						
Active Pop						
Total	165	225	127	913	2,908	49,461
Male	138	153	82	570	2,128	37,330
Female	27	72	45	343	780	12,131
Participation Rate						
Total	54.6	66.11	69.21	76.09	57.43	58.47
Male	88.03	87.71	86.48	90.16	82.68	86.80
Female	18.48	43.25	50.71	60.41	31.32	29.17

Source: Statistical Yearbook of Bangladesh – 2010, Bangladesh Bureau of Statistics

Millennium Development Goals (MDGs)

Some indicators selected from "Multiple Indicator Cluster Survey" to assess MDGs achievement in CHT and Cox's Bazar are shown in Table 3-11. The indicators other than MDGs No. 6.3, 7.8 and 7.9 have already been described above. In No. 6.3, we used female's comprehensive knowledge in HIV/AIDS. It is lower than national average in any district. Indicators for safe drinking water and improved sanitary facility are crucially low in CHT.

No. in MDG	Indicators	Current Status	Target by 2015	Status of Progress	Khagrachari	Rangamati	Bandarban	Cox's Bazar
2.2	Proportion of pupils starting grade 1 who reach grade 5	79.8 (2009)	100	Z	78.9	79.9	61.9	59.3
2.3	Adult literacy rate of 15-24 years of population (Female)	72.0 (2009)	-	-	53.8	52.7	39.8	54.4
3.1a	Ratio of girl to boys in primary education (Gender Parity Index)	1.03 (2009)	1.0	\rightarrow	1.01	1.02	1.04	1.02
3.1b	Ratio of girl to boys in secondary education (Gender Parity Index)	1.17 (2009)	1.0	\rightarrow	1.06	0.98	1.02	1.38
4.1	Under-five mortality rate	64 (2009)	48	\rightarrow	63	45	85	72
4.2	Infant mortality rate	49 (2009)	31	\rightarrow	49	36	63	54
6.3	Proportion of population aged 15-24 years with comprehensive correct knowledge of HIV/AIDS	15.8 (2006		Low Knowledge	15.6	11.4	7.2	12.5
7.8	Propotion of population using improved drinking water sources	97.8 (2009)	100	\rightarrow	69.7	66.5	67.8	96.6
7.9	Proportion of population using an improved sanitation facility	54.1 (2009)	60	N/A	42.7	48.6	33.2	58.0

Table 3-11: Selected MDG Indicators in CHT and CXB

Source: Produced by research team based on *Bangladesh Millennium Goal at Glance and Multiple Indicator Cluster Survey 2009 Volume II*, Chittagong Division.

3.1.6 Basic Infrastructure

Road

As it is shown in Table 3-12, road construction in CHT is underdeveloped. It is assumed that the situation of road construction will be a negative factor for development of other sectors. On the other hand, it is indicated by some of interviewees that rapid development of road communication may also have negative impact on the local society and environment.

Table 3-12: Road Type and Length

Surface Type	Khagrachhari	Rangamati	Bandarban	Cox's Bazar
Earthen	2113.32	4602.47	1897.09	316.93
Flexible Pavement				
(BC)	222.8	118.67	142.97	363.99
Brick Pavement				
(WBM/HBB/BFS)	459.19	224.95	188.60	264.15
Rigid Pavement				
(CC/RCC)	0	25.78	9.76	7.72
Total Length	2795.31	4971.87	2238.42	952.79

Source: Local Government Engineering Department, Basic Information of Road

Medical Facilities

It was realized that there is high demand of medical facilities as basic infrastructure. Table 3-13 shows the number of doctors, nurses and beds in each district in the southeastern region.

	K	hagracha	nri	F	Rangama	ti	E	Bandarba	n	C	ox's Baz	ar
	Doctor	Nurse	Bed	Doctor	Nurse	Bed	Doctor	Nurse	Bed	Doctor	Nurse	Bed
Clinic	13	33	24	3	7	0	0	1	0	N/A	N/A	N/A
FWC	13	64		11	14	0	8	13	0	N/A	N/A	N/A
Primary												
Health												
Care	6	264	0	2	5	0	1	0	0	N/A	N/A	N/A
Maternity												
Center	3	14	0	2	1	2	2	6	10	N/A	N/A	N/A
Hospital	133	218	424	48	174	393	42	81	173	N/A	N/A	N/A
Total	168	593	448	66	201	395	53	101	183	N/A	N/A	N/A
Population												
Per No.	3,129	886	1,173	7,700	2,528	1,287	5,625	2,952	1,629	N/A	N/A	N/A
Source: Bar	ngladesh	Bureau c	f Statisti	cs websi	te· http://	www.bb	s gov bd	/Rnt7illa	Profile a	sny Feh	2012	

Table 3-13: Numbers of Doctor, Nurse and Medical Facilities

Source: Bangladesh Bureau of Statistics website: http://www.bbs.gov.bd/RptZillaProfile.aspx, Feb., 2012

Population per doctor is higher in Rangamati and Bandarban as Table 3-13 shows. Population per nurse in Bandarban is highest, and Rangamati follows next. Population per bed shows a similar tendency. Medical facilities in Khagrachhari are comparatively better than other districts in CHT.

Educational Facilities

Generally speaking, needs of educational service and facilities are very high in CHT and CXB. Table 3-14 shows the teacher-student rate in CHT and CXB. As can be seen in the table, CXB has an outstandingly high teacher-student rate. The rates are approximate in CHT districts, but Bandarban's rate is a little higher than the other two districts. The teacher-student rates in secondary school are almost equal in CHT and CXB; meanwhile, the rate of junior high school in CXB is conspicuously high.

	Khagrachari	Rangamati	Bandarban	Cox's Bazar
Primary School	1,186	743	341	616
Teacher	4,879	2,824	1,171	3,032
Student	193,143	130,146	37,133	271,813
Teacher-Student Rate	40	46	32	90
Secondary High School	112	93	29	111
Teacher	1,634	1,182	215	1,259
Student	49,776	34,902	9,345	56,423
Teacer-Student Rate	30	30	43	45
Junior High School	90	46	12	18
Teacher	484	297	50	104
Student	13,246	8,439	1,522	67,719
Teacher-Student Rate	27	28	30	651

Source: Bangladesh Bureau of Statistics website: http://www.bbs.gov.bd/RptZillaProfile.aspx, Feb., 2012

Irrigation Facilities

CHT and CXB are not well equipped with irrigation facilities. Table 3-15 shows the area covered by different irrigation facilities in CHT and Chittagong which includes CXB. The Table 3-15 shows that there is no tube-well for irrigation in CHT at all, but only power pump and traditional method. In other words, it is surmised that CHT is disadvantaged in production of boro rice which highly depend on irrigation due to poor irrigation facilities.

							(,000 acre)
D: / : /	Power		Tube-well	Tube-well		Traditional	Total Irrigation
District	Pump	Deep	Shallow	Hand	well	Method	Area
Khagrachari	22	0	0	0	0	27	49
Rangamati	15	0	0	0	0	10	25
Bandarban	13	0	0	0	0	13	26
Chittagong	270	15	35	2	52	72	394
National	2,696	2,449	10,111	59	15,315	871	16,136

 Table 3-15: Irrigation Facilities and Covered Area (2009/2010)

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

3.1.7 **Poverty Situation**

As we have already seen with the Poverty Map in Chapter 1, population under poverty line in CHT and CXB is comparatively high in Bangladesh. Taking into account with much circumstance, poverty rate is higher in the hill side where it is away from the district centers in CHT and coastal areas in CXB. Out of five districts in the southeastern region, the poverty rate in Bandarban and CXB are higher. Table 3-16 provides the number of households by landholding size which may be one of the factors indicating poverty. In CHT and CXB where income source is mainly based on agriculture, landholding is closely related to poverty. Figure 3-16 demonstrates that landless household is 46% in Bangladesh, while rates of landless in Chittagong and CXB are 71% and 52% respectively. On the other hand, the rate of landless in CHT is only from 20 to 30% in spite of high poverty rate. Taking account the correlation between high poverty rate and greater landholding, it may be assumed that the productivity of land in CHT and CXB may be lower than other districts, or access to the market may be one of the factors preventing farmers from income generation by agricultural production.

	Khagrachhari	Rangamati	Bandarban	Cox's Bazar	Chittagong	National
All Holdings	130,480	112,147	66,424	332,304	1,376,536	28,165,700
Non-farm Holdings	31,804	44,083	20,369	172,913	974,840	13,076,613
Farm Holdings						
Total	98,676	68,064	46,055	19,391	401,696	15,089,087
Marginal (0.05-0.49 acre)	26,687	9,778	9,770	70,385	181,258	5,828,809
Small (0.5-2.49 acre)	53,290	32,109	19,716	76,492	194,176	7,522,541
Medium (2.5-7.49 acre)	17,217	24,181	13,687	11,797	24,416	1,560,774
Large (7.5- acre)	1,481	1,996	2,883	717	1,846	176,962

Table 3-16: Number of Household by Landholding Size

Source: Yearbook of Agricultural Statistics of Bangladesh-2010.



Figure 3-6: Rate of Household by Landholding Size

3.1.8 Public Services

Public Services are mostly delivered by Nation Building Departments (NBDs) which have about 94% of the development budget shown in the table 3-17. Hill District Councils supervise the implementation of development projects conducted by transferred NBDs in CHT but have limited role of budget formulation. Besides sector-wise budget, development assistance is allocated to the District Council in CXB, Hill District Councils in CHT, and CHT Development Board. The parallel structure is seen in terms of the budgeting system.

Expanded Programme on Immunization (EPI) is well implemented in both CHT and CXB. However, other public services are not well provided to villagers due to difficult access to villages especially in CHT.

Bangladesh Rural Development Borad (BRDB) implements Participatory Rural Development Project 2 (PRDP 2) for linkage between government agencies and villagers in 4 unions in each district of CHT and CXB.

			•	•	•	(10 m	illion TK)
Sl.		Local					
No.	Sector/Program	Currency	%	Budgeted	%	Total	%
1	Agriculture	1968.67	7.21	765.97	4.10	2734.64	5.94
2	Rural Development and Rural						
	Institution	3186.88	11.67	1215.97	6.51	4402.85	9.57
3	Water Recourses	959.72	3.51	415.10	2.22	1374.82	2.99
4	Industry	613.25	2.25	52.39	0.28	665.64	1.45
5	Electricity	4688.37	17.16	2484.10	13.29	7172.47	15.59
6	Fuel, Gas and Natural Resources	395.64	1.45	718.36	3.84	1114.00	2.42
7	Transportation	3344.52	12.24	4405.27	23.58	7749.79	16.85
	a) Road Transportation	1856.00	6.79	2885.35	15.44	4741.35	10.31
	b) Railway, Waterway/ River and						
	Civil Aviation Transportation	1488.52	5.45	1519.92	8.13	3008.44	6.54
8	Communication	98.20	0.36	206.43	1.10	304.63	0.66
9	Physical Planning, Water Supply						
	and Housing	2888.23	10.57	2762.83	14.79	5751.06	12.28
10	Education and Religion	3847.97	14.09	2276.70	12.18	6124.67	13.31
11	Sports and Culture	262.06	0.96	4.50	0.02	266.56	0.58
12	Health, Nutrition, Population and						
	Family Welfare	2251.26	8.24	1691.27	9.05	3942.53	8.57
13	Public Relation	110.58	0.40	5.78	0.03	116.36	0.25
14	Social Welfare, Women and Youth						
	Affairs	323.83	1.19	121.29	0.65	445.12	0.97
15	Public administration	455.51	1.67	630.11	3.37	1085.62	2.36
16	Science, Information and						
	Communication Technology	160.08	0.59	76.94	0.41	237.02	0.52
17	Labor and Employment Generation	160.72	0.59	14.33	0.08	175.05	0.38
Sub '	Total: 17 Sector	25715.49	94.14	17847.34	95.52	43562.83	94.70

Source: Annual Development Plan, 2010

Table 3-18:	Breakdown	of Project	Budget
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				j	5	(10 m	illion TK)
Sl.		Local					
No.	Sector/Program	Currency	%	Budgeted	%	Total	%
Devel	opment Assistance						
18	a) Upazilla Development						
	Assistance	400.00	1.46	0.00	0.00	400.00	0.87
	b) Union Council						
	Development Assistance	40.00	0.15	0.00	0.00	40.00	0.09
19	Municipality Development						
	Assistance	320.00	1.17	0.00	0.00	320.00	0.70
20	CHT Development						
	Assistance	85.00	0.31	0.00	0.00	85.00	0.18
21	CHT Local Govt.						
	Development Assistance	30.00	0.11	0.00	0.00	30.00	0.07
22	CHT Development Board						
	Development Assistance	35.00	0.13	0.00	0.00	35.00	0.08
23	Particulars Areas						
	Development Assistance						
	(excluding CHT)	15.00	0.05	0.00	0.00	15.00	0.03
24	District Council Development						
	Assistance	300.00	1.10	0.00	0.00	300.00	0.65
25	City Corporation						
	Development Assistance	135.00	0.49	0.00	0.00	135.00	0.29
26	Development assistance for						
	Special Needs	239.51	0.88	837.66	4.48	1077.17	2.34
Sub Total: Development Assistance		1599.51	5.86	837.66	4.48	2437.17	5.30
Total	(17 Sector + Dev. Assistance)	27315.00	100	18685.00	100	46000.00	100
Grand Total		27315.00	100	18685.00	100	46000.00	100

Source: Annual Development Plan, 2010

Implementation set-ups of Hill District Councils in CHT and District Councils in CXB are as follows according to the interviews:

Name of the		Existing	Khagrachhari	Rangamati	Bandarban
Office	Name of the Position	post	Vacant Post	Vacant Post	Vacant Post
	Personal Secretary of Chairman	1	1	-	0
	Public Relation Officer	1	1	-	1
	Stenographer (PA) Cum				
Office of the	Computer Operator	1	0	-	0
Chairman	Driver	1	0	-	0
	Depositor	1	0	-	0
	Orderly	1	0	-	1
	MLSS	2	0	-	0
	Sub-Total	8	2	-	2
	Chief Executive Officer	1	0	-	0
Chief	Stenographer (PA) Cum				
Executive	Computer Operator	1	0	-	0
Officer	Driver	1	0	-	0
	MLSS	1	0	-	0
	Sub-Total	4	0	-	0
	Executive Officer/ Senior		0		0
	Assistant Secretary	1	0	-	0
	Administrative Officer	1	0	-	0
	Computer Operator	1	0	-	0
	Upper Divisional Assistant	1	0	-	0
	Office Assistant	1	0	-	1
	Computer typist	1	0	-	0
	Assistant Librarian	1	1	-	1
Department of	Mechanic	1	0	-	1
Administration	Driver	4	0	-	1
	Electrician	1	0	-	1
	Duplicate Machine Operator	1	0	-	1
	Messenger	1	0	-	0
	MLSS	1	0	-	0
	Guard	1	0	-	1
	Sweeper	1	0	-	1
	Speedboat Driver	1	-	-	-
	Night Guard	8	0	-	1
	Gardener	1	0	-	1
	Sub-Total	27	1	-	10
	Executive engineer	1	0	-	0
Dept of Engineer	Assistant Engineer	2	2	-	0
	Sub Assistant Engineer	4	0	-	0
	Drafts man	1	1	-	1
	Upper Divisional Assistant	1	0	-	0
	Office Assistant	1	0	-	1
0	Computer Typist	1	0	-	0
	Account Assistant	1	0	-	0
	Work Assistant	4	0	-	4
	Driver	1	0	-	1
	MLSS	3	0	-	0
	Sub-Total	17	3	-	7

Table 3-19: Manpower and Vacancy of CHT District Council

Name of the		Existing	Khagrachhari	Rangamati	Bandarban
Office	Name of the Position	post	Vacant Post	Vacant Post	Vacant Post
Land Office	Land officer/Senior Assistant				
	Secretary	1	0	-	0
	Kanungo	1	0	-	1
	Surveyor	1	0	-	1
	Office Assistant	1	0	-	0
	Chairman	2	0	-	1
	MLSS	1	0	-	0
Sub-Total		7	0	-	3
Accounts and Audit Branch	Accounts Audit Officer	1	0	-	0
	Accountant	1	0	-	0
	Junior Auditor	1	0	-	1
	Accounts Assistant	1	0	-	0
	Computer Typist	1	0	-	0
Sub-Total		5	0	-	1
	Total Post and Vacancy	68	6	-	23

Table 3-20: Manpower and Vacancy in CXB District Council

Description	Name of the Position	Existing post	Vacant
Chairman	Chairman	1	0
	Stenographer (PA)	1	1
	Driver	1	1
	MLSS	2	2
	Sub-Total	5	4
Chief Executive	Chief Executive Officer	1	1
Officer	Stenographer (PA)	1	0
	Driver	1	0
	MLSS	1	0
	Sub-Total	4	1
Dept. of	Secretary	1	1
Administration	Administrative Officer	1	0
	Chief Assistant	1	0
	Upper Divisional Assistant	1	0
	Accountant/Assistant Accountant	1	0
	Lower Divisional Assistant Cum typist	1	0
	Driver/Motor Mechanics	1	0
	Duplicating Machine Operator Cum Peon	1	0
	Guard	1	0
	Data Messenger	1	1
	MLSS	2	2
	Sweeper	1	0
	Sub-Total	13	4
Dept. of	Assistant engineer	1	0
Engineering	Sub Assistant Engineer	1	0
	Upper Divisional Assistant	1	0
	Lower Divisional Assistant Cum Typist	1	0
	Surveyor	1	1
	Electrician	1	0
	MLSS	2	0
	Sub-Total	8	1
	Total	30	10
3.2 Community Profiles

3.2.1 Khagrachhari

Shimana Para

(Dighinala Upazila)

History

Tripura people consisting of 7 to 8 households moved to this village about 150 years ago in the process of shifting cultivation. The present Karbari is the third generation. Other households also moved to this village and population increased up to 80 households. Diarrhea became widespread in 1965 and 2000. Villagers had to eat natural taro due to poor harvest in 1980. A cyclone hit the village badly in 1991.

Society

It is a paternal society. Properties of fathers are inherited by sons and properties of mothers are inherited by daughters. Tripura has 36 clans. It is rare for several clans to live in the same village. It is common to marry within the same clan. Marriage with other clans is also seen traditionally but marriage with other ethnic groups is a recent phenomenon. All the villagers are Hindu. Villagers celebrate religious events together. When a villager dies, all the villagers contribute 10 TK for the funeral. When a villager falls into trouble, other villagers help him/her. Reciprocal practice is in common among villagers without money. Marriage is also conducted with help of each other.

Village meeting

Villagers consult Karbari when a dispute arises. To submit the claim, he/she pays 50 TK or a drink of alcohol as a fee. Villagers hold a meeting as necessary like religious events, school construction, and so on. The leader of an event assumes the responsibility of the chairperson. The Karbari is not necessarily the chairman but is informed of the decision of the meeting.

Natural conditions

The overall geology of the area consists of Surma group, Boka Bill formation and Tipam group, Tipam Sandston formation of Neogene age. Field survey identified sand stone and silt stone around village.

The village is located on dividing ridge between Chingri River and Myani River. Elevation is about 230 m. On the ridge slope, V-shaped valley has formed on a hill slope, and the valley is few hundred meters to one kilometer long. The V-shaped valleys join with the main valley which has flat land on the bottom of valley. At the meeting points between V-shape valley and main valley, there are springs which is used as drinking water sources by villagers. During the rainy season (from June to October) V-shape valley has water flow. Within the village area, small landslides occur sometimes but there are close to no human damage.

Socio-economy

Agriculture is the base of economic activities. Agricultural production is basically for selfconsumption. Income from agricultural production is limited; nevertheless, surplus from jhum cultivation and home gardening are important income source for villagers. Since the production from jhum cultivation is not stable these days, income is inevitably unstable.

Major crops in jhum cultivation are rice, til, taro, pumpkin, eggplant, banana and others. Each household has a small fruit garden around the settlement. Small portion of flat land on foot of the hill is utilized for horticulture production such as radishes and beans during dry season. Villagers also utilize the hill slope to produce timber wood. Turmeric and banana are main income sources in this village. Because the income from these crops is limited, they also earn money through day labor.

There is a school run by an NGO in the village. A governmental school is located in the neighboring village, but it is difficult for children to go to school due to the far distance. Students who go to secondary school need to go to the nearest town, but it is also too far to go every day.

Access to medical facilities is not good. Basic medicines are available in a small shop in the village. There is a woman trained in health care by an NGO who is able to provide basic health advice.

The biggest cultural event for village is Boishabi which is usually held in the beginning of rain season (Boishak). Loki Puja which is held in August is an important religious ritual in the village.

Poverty

The livelihood of village is based on jhum cultivation. Villagers produce essential crops for their daily consumption. Other necessary food items are purchased by money earned through sale of surplus agricultural production and day labor. Wage of day labor is about 200 TK for male and 150 TK for female. Since they do not have opportunity of day labor regularly, income from the labor is unstable.

According to a hearing with villagers, approximate annual income from cash crops such as banana and some jhum productions is 36,000 TK.

Housing in the village is basically tin sheds and dirt walls. Rooms are separated into different functions such as bedrooms, dining and storage. Kitchen with food storage is separated from the main building.

Sanitary latrines are not available, but villagers use self-made toilets built near their houses. The latrienes are walled by bamboo covers, but there is no roofing.

Livelihood

Livelihood of the village based on jhum cultivation, cash crops and day labor. Necessary food items are produced by jhum, and items unavailable in the village such as food, goods and medical services are covered by money earned from day labor and sale of surplus agricultural products. They produce rice as staple food, but rice produced on jhum can cover only 50% of village's needs. It is said that village cultivates about 5 acre of jhum on average. About 2–3 acres of land out of 5 are usually utilized for rice cultivation. Yield of rice per acre is only 1 ton which is much less than HYV rice usually cultivated in flat land.

Turmeric is the main cash crop in this village. Price of raw turmeric is about 500 TK per 40 kg and dried turmeric is 32,000 TK per 40 kg. Because the weight of turmeric decreases to one fifth when it is dried, 40kg of dried turmeric is equal to 200 kg of raw turmeric worth 25,000 TK. Thus, villagers can produce about 700 TK value from 200 kg turmeric by drying.

Problem in agriculture is damage by wild animals such as monkeys, squirrels and wild pigs. Only one villager who works in the district office earns a regular salary. There is no household receiving remittance. Villagers spend cash on food items which are not produced in village such as dry fish, spices and oil.

Land Ownership

Villagers used to utilize the vast area of hill slope for jhum cultivation. Jhum cycle was more than 10 years at that time. Due to natural population growth and migration, they can use limited land for jhum. They are now forced to cut down the cycle of jhum to 2-3 years.

Villagers usually decide where they cultivate for jhum every year in village meetings. Villagers themselves divide the area selected at meetings. Each household usually use 2 acres of land for jhum cultivation these days.

Infrastructure

There is a brick road from main road to the entrance of the village. That road has been built by CHT Development Board.

Safe drinking water

There is no improved water supply device for drinking. All villagers are using stream water or spring water. The main water source is located 3 km away from village and more than 50 meters lower in elevation. 3 hours are needed to collect water.

Near the village, there is a ring well which was installed by DPHE. Several years after installation, the ring well was abandoned due to no water in dry season.

Community Infrastructure

Road communication in village made along with ridge of hill. The village roads are managed by the village committee. There are no bridges or channels.

Public services

It is about 20 km to Union Parishad. Due to the hilly location and no direct shortcuts, villagers have to go to Union via Upazila. The Sub Assistant Agricultural Officer rarely visits. Access to public services is very poor. EPI is conducted but villagers are afraid of injections.

Assistance

Zabarang (NGO) supported construction of a primary school and posted a teacher. Villagers contributed to school construction. Villagers bought cows using Quick Impact Fund. A rice bank was also established. Union Parishad received 1.3 million TK from Local Governance Support Project (LGSP).



Nuru Siqdar Para

(Matiranga Upazila)

History

Villagers moved to this village from India in 1962. The present Sardar is second generation. The Sardar position is not hereditary but selected by villagers as a leader. The population increased up to 100 households. Villagers suffered from heavy floods in 1987 and 1995.

Society

It is a paternal society. Property of parents is inherited by sons and daughters according to Islamic law. It is common for parents to arrange marriages. Villagers help marriage of poor households but usually hold marriage ceremony individually. When villagers receive help from other villagers, they usually pay money for help. Villagers celebrate religious events together.

Village meeting

Villagers consult Sardar when a dispute arises. There is no custom to pay money as a fee for consultation. When the dispute is beyond the capacity of Sardar, villagers go to Union Parishad Members, Union Paridhad Chairman, and Upazila Parishad Chairman. Decisions on communal work, like construction of religious places, are made at village meeting presided by Sardar. 5 to 6 village meetings are conducted in a year on average. A meeting of Para Development Committee (PDC) is held monthly. Villagers discuss collecting savings at PDC meetings. Balance of PDC fund is 279,000 TK as of now.

Natural conditions

The overall geology of the area consists of Duti Tila formation of Neogene to Pleiocene age. Field survey identified mainly sand stone.

From a geographical point of view, this area is classified as low hills and top of hills is formed by flat land, where residential area is located. Around the low hills, there is a valley with flat land. Relative elevation between the bottom of valley and the hilltop is approximately 15 m to 20 m. Most valleys have springs that source small streams which are used for terraced paddy fields.

Socio-economy

Basically, agriculture is the main economic activity. Main crops in this village are rice, vegetables, spices and fruits. They cultivate rice on small flat land between hills. Vegetables, other cereals, spices, vegetable and fruits are produced on slopes. The main crops cultivated on slopes are turmeric, ginger, banana, taro, cabbage, cauliflower, potato, pumpkin and beans. Most of products are basically for self-consumption, and small amounts of surplus are sold in local markets. Banana and turmeric are cultivated mainly as cash crop.

Water reservoir for rice cultivation is used for fish cultivation as well. Some villagers invested in fish culture. Each family owns livestock such as cattle, goats and chickens. These livestock are sold when they need cash. Many households own only 1 or fewer acre of land, so production of cash crops such as turmeric and some vegetables are limited. Thus, villages usually earn money by day labor.

There is one primary school built by the community. It is registered with the government, but practically run by the community. All children go to the primary school. Secondary school is located in a neighboring town, so only 10 students attend. Only one student respectively attends high school and university.

A hospital is located in town, an hour drive from the village. There was a case that a child

badly injured died before reaching hospital. Usually, villagers use pharmacies in nearest market, if symptoms are not so serious.

There are Eid related religious events in this village.

Poverty

Staple foods in this village are rice and vegetables produced in home gardens. Meat and fish are eaten once or twice in a month.

Houses are made of wood, and dirt or bamboo walls and tin roof are common. The kitchen is usually separated from main house, but structure is almost the same.

There are not many sanitary latrines, so usually huoseholds build toilets themselves.

Livelihood

Income sources of a standard household in this village are surplus of banana, jackfruit, and turmeric production. For example, bananas can be harvested twice a year, and villagers usually earn 300–400 TK per tree in one season. Jackfruit can be harvested once a year, and they can earn about 1,000–2,000 TK per tree. Income from turmeric fluctuates by year.

Villagers usually can sustain their livelihoods by income from agriculture only for 2 or 3 months; thus, they need sell labor to earn money for rest of the year. Wage of labor is usually 200TK for male and 150TK for female.

A calf was given to 80 families by UNDP fund. They can get profit by refunding the value of calf from the money recovered by sale of cattle. Every family has some livestock such as goats and chickens. They sell them according to need of cash.

There are seven families receiving remittance from foreign countries. Five are working in Qatar and two are in Bahrain.

Average expenditure of one family with 6 members is estimated as 2,000 TK.

Grameen Bank and other NGOs provide micro-credit, and many households depend on these programmes.

Land Ownership, Institution

Most of the land belongs to the government called khas. Private-owned land is very limited. Many families build their house on 1 acre of land, and cultivate fruits and vegetables around the house. Some of villagers rent flat land and cultivate rice.

There is one body of water for rice irrigation. Some families rent the pond as a group for fish culture.

Infrastructure

There is a brick road from main road to the village which was built by CHT Development Board.

A primary school was built in the village. A small embankment was developed to supply irrigation water and fish culture.

Safe drinking water

There are 22 STWs in the village. Villagers use mainly STWs. Most of STWs are located at ending point of flat land of valley. Approximately 90% of STWs were installed privately.

Community Infrastructure

The village road is managed by the community. There is no bridge or channel.

Public services

It is about 7 km to Union Parishad and about 16 km to Upazila. Sub Assistant Agricultural Officer visits occasionally. EPI is well conducted. The problem is no access to nearby medical services. A worker was posted in the community clinic 2 months ago. Generally speaking, doctors are reluctant to be posted in remote areas.

Assistance

A brick road was constructed in the village in 2007 by CHT Development Board. Alo (NGO) also helps PDC activities. Villagers bought cows by Quick Impact Fund. There is no Rice Bank in this village.



Main STW used by villagers



Banana plantation on slope



Fruit plantation and paddy fields





Paddy field irrigated from spring



Sapping date tree



Reservoir made by riverbank



3.2.2 Rangamati

Sagu Para

(Rangamati Sadar Upazila)

History

The village was formed more than 150 years ago when 5 out of 15 households in the village moved to this location in 1960 due to Kaptai Dam construction. The present Karbari is the second generation. The village has 23 households now. A cyclone hit the village heavily in 1991.

Society

It is a paternal society. Properties of parents are inherited by sons. It is common for parents to arrange marriages though an increasing number of young couples are making their own decisions recently. 3 clans of Chakma peoples live in the village. Marriage among sub-clans is inhibited. All villagers are Buddhists and have a temple in the village. Villagers celebrate religious events together. When a villager falls into trouble, other villagers help him/her. Reciprocal practice is common among villagers without money. Weddings are also conducted with help of each other.

Village meetings

Villagers consult Karbari when a dispute arises. To consult the matter, he/she pays 10 TK as a fee. Karbari and elders mediate in an open space in the village through a committee. Villagers can also make comments on the mediation. When a fine is imposed, the money is used for eating and drinking among villagers. The Headman of this Para is Raja himself. When the dispute is beyond the capacity of Karbari, villagers go to Raja for solution. 1 to 2 village mediations in a year are conducted on average. There are no thieves in the village. Every July, the Union Parishad Chairman, Karbari, PDC representative, and villagers get together for discussion on village events and development work.

Natural conditions

The overall geology of the area consists of Tipam group, Tipam Sandston formation of Neogene age. Field survey identified sand stone and silt stone in alternate layers.

From a geographical point of view, this area is classified as low hills and the top of the hills is formed by flat land, where the village is located. Around the low hill area, there is a valley with flat land. Height difference between the bottom of valley and hilltop is about 10m to 15 m. Most valleys have springs that source small streams which are used for terraced paddy fields.

Socio-economy

Economic activities are based on fishery in Kaptai Lake and agriculture. Cash crops are very limited, and fishery is mainly for self-consumption.

Terraces are made along a creek toward the lake. Land is categorized according to accessibility to water. First category is near hills where enough water can be collected. Second category land is located in the middle of terrace where water can still be drawn. Third category land is where it is difficult to bring water. Production of rice per acre in first, second and third category land is 0.8 tons, 0.7 tons and 0.4 tons respectively. Every household has land on hill slopes, so they produce horticulture products. Main crops cultivated on slope are banana, jackfruit, orange, turmeric, ginger, radish, pumpkin, beans, cucumber, sweet potato, chili and eggplant.

Villagers fish from June to August. They usually use large fishing nets as group. They do not conduct fish culture. Almost all households own livestock such as cattle, goat, poultry and pigs.

Villagers are keen to send their children to school. Thus, all children go to primary school. 14 students go to secondary school, 16 go to high school, and 3 students go to university. There is one Ph.D. graduate who teaches at the University of Dhaka.

There is a medical center which has 15 beds in a neighboring village, but there is no doctor or even a nurse. Thus, people usually use the hospital in Rangamati town.

There is a religious event from October to November and Buddha Ponima is held in April to May.

Poverty

There is no particular income source in the village. Every household engages in agriculture, fishery and animal rearing. The scale of production is small, but they earn small amount of money from each sector. Because they make money according to their need by selling surplus of any products, they do not have savings.

Houses are made of dirt walls and tin sheds. There are only two sanitary latrines. Each household usually has a home garden to produce food for self-consumption.

Fish is often available because of fishery in Kaptai Lake. Vegetables are produced at the household level, so villagers can afford to eat vegetables every day.

Livelihood

Villagers' income sources are agriculture, fishery, livestock and timber. Income from day labor is limited in this village. There are few families which receive remittance. Every family has women who can make traditional textiles. These textiles are sold at local events.

Land ownership

The average household land is 3 acres with the exception of few households owning more than 10 acres. Two thirds of the land is located in a hilly area where villagers plant timber trees, banana, turmeric, ginger, and so on. Most households cultivate horticulture products and some households with more land area cultivate rice using ravine water. All the households are said to have legal land ownership granted by Circle Chief.

Infrastructure

There is no paved road or bridge. Irrigation water is dependent on spring water. There is a concrete ditch which was made by ADB's budget.

The village is unelectrified but all households have solar photovoltaic power generation system.

Safe drinking water

There is a private STW, a Tara pump and more than ten springs as drinking water sources. Additionally there are two inactive ring wells. Usually villagers use spring water. Kaptai Lake water is used for bathing and washing but not drinking. During the peak of dry season, if springs dry up villagers collect drinking water from the STW. In rainy season some springs become submerged in Kaptai Lake water.

Community Infrastructure

There is a pre-primary school supported by UNICEF. There is a primary school and a secondary school near the village.

Since there is no market, villagers need to go to Rangamati town.

There is a graveyard which is established by a villager near the lake.

Public services

Union Parishad Office is in the town of Rangamati. Union Parishad Complex is expected to be constructed in the village. Sub Assistant Agricultural Officer visits as per request over the phone. There are 2 high schools and teachers commute by boat across Kaptai Lake. The Veterinary assistant rarely visits. Vaccination for livestock was conducted by NGO. EPI is well conducted.

Assistance

Union Parishad received 800,000 TK in 2010/11 from LGSP. DPHE installed 2 shallow tube wells funded by DANIDA. Integrated Community Development Project (ICDP) installed ring-wells. Villagers bought a solar power system, boat, and cows by Quick Impact Fund. Rice Bank was also established.





Textile made by village women



Main spring used by villagers



Pump not used due to odor



Home garden instructed by DAE



Kitchen of a standard house



Terraced paddy fields irrigated from spring



Bar Ghonia Para

(Kaptai Upazila)

History

5 households moved to this village in 1935 seeking arable land. The present Karbari is the second generation. The village has 64 households now. 12 households are Bengali settlers. The village is located in valley, which is why damage from cyclone in 1991 was not so severe.

Society

It is a paternal society. Property of parents is inherited by sons. It is common for parents to arrange marriage though an increasing number of young couples are making their own decisions recently. 1 out of 11 clans of Tanchangya peoples lives in this village. Tanchangya people are Buddhist and have a temple in the village. They marry within the same clan and marriage among sub-clans is not inhibited. Reciprocal practice is in common among villagers without money. Villagers celebrate religious events together. When a villager falls into trouble, other villagers help him/her.

Village meeting

Villagers consult elders and Karbari when a dispute arises. To consult the matter, he/she pays 10 TK as a fee. Karbari and elders mediate in open space in the village through a committee. When a young couple marries without permission of their parents, a fine of one pig is imposed. Villagers eat the pig. There are no thieves in the village. Village mediation rarely happens. 5 to 6 village meetings are conducted in a year on average for discussion on religious events, cultivation, and so on. PDC meeting is held monthly for discussion on development work.

Natural conditions

The overall geology of the area consists of Surma group, Boka Bil formation of Neogene age. Field survey identified sand stone and silt stone in alternate layers.

From a geographical point of view, this area is classified as low hills and top of hills is formed by small flat land. Around the low hill area, there is a valley with flat land. Therefore residence area is located at the base of hill slope where it is a little higher than flat land of the valley.

Most valleys have springs. The spring water makes small streams which are used for terraced paddy fields.

Socio-economy

People in this village live on agriculture, fishery, livestock and forestry. This village has flat land along the river; thus they cultivate rice. Because private investor constructed a creek dam in village, they have water supply for not only growing rice but also vegetables during dry season. They use not only gravity irrigation but also pump irrigation.

Agricultural land is categorized into first and second categories according to condition of irrigation. First category lands are located upstream where water access is better. Second category lands are located downstream where they have water shortage. HYV purchased from DAE is utilized for both categories. Approximate yield of rice per acre is 1.4 tons in the first category, and 1 ton in the second category.

People produce other major crops and vegetables such as maize, sugar cane, potato, radish, tomato, cauliflower, cabbage, cucumber and others. They also cultivate crops on jhum such as turmeric, ginger, taro, and banana. Households which have land cultivate fruits such as

mangoes, jackfruits, papayas, and tamarinds.

Basically, these crops are produced for self-consumption. When there is surplus production, villagers sell them to middle man who visits the village once a week.

Villagers culture fish in a creek dam constructed by the local government. They fish once a year. Some households keep domestic animals at the household level. Cattle are used for plowing, and milking. Rearing goats and pigs are common, but one household rears pigs for commercial purpose. Many households grow timber trees on their slope land.

The level of education is comparatively high in this village. All children go to primary school, and complete primary education. 70% go to secondary school. There are some villagers who have finished undergraduate level.

Access to medical facilities is not very good. There is no medical facility or pharmacy near the village. Thus, they need to go to Kaptai town for any treatments.

There are religious festivals called Bud Panima, Assin Panima, and Madu Panima in this village.

Poverty

Most households do not have regular income from agriculture, fishery, livestock and forestry; therefore, they earn money for daily expenditure by selling surplus products. When they need a certain amount of money, then they usually sell livestock or timber. There are few villagers who have regular income.

Houses are usually built on hills. They use soil for walls and tin for roofs. Rooms are functionally separated such as kitchen and bedrooms. There are 40 sanitary latrines in this village. Villagers produce fruits in their home gardens.

Villagers eat rice and vegetables every day, but meat and fish only once or twice a week.

Village women produce textiles for their traditional clothes that they usually wear. Clothes are produced by almost every household, but they do not sell them out of the village.

Livelihood

Main income source of this village is surplus from agriculture, fishery, livestock and forestry. Main cash crops are rice, turmeric, ginger, banana, and jackfruit.

Expenditure of a family of five members is about 5,000 TK. There are 35 persons who have a regular salary.

There is no remittance from foreign country.

Land ownership

Average land ownership is 3 acres. About 30% is flat land, and rest of land is on hill slopes. They utilize flat land for rice cultivation and horticulture. Slopes are used for jhum cultivation, fruit plantation, and timber production. Villagers have legal ownership of their land. There is no village common forest.

Infrastructure

From the main road to the village, there is a brick road which was constructed by district council. Presently, improvement of access road and concrete embankment between road and paddy fields is under construction by district council. A mini dam for irrigation was constructed in 2004 by BWDP with 3 million taka. Electrification is 100% completed.

Safe drinking water

There are ring wells, STWs which were installed by Union, HYSAWA project and other organizations. Spring water is also being used because it is available all year long.

Community Infrastructure

There is a primary school. Apart from the creek dam constructed by the government, there is another small dam under construction by private investment. There is no medical facility in the village. There is no regular market, but they have one grocery shop.

An irrigation system is established, but it is only to supply water to paddy fields in village.

Public services

It is about 2 km to Union Parishad and about 3 km to Upazila. Villagers receive the same service as other areas, like old age allowance from Union Parishad. Sub Assistant Agricultural Officer comes and provides technical advice. Family planning workers also visit to provide their services. EPI is well conducted. A community clinic has not been constructed because villagers do not contribute the land for construction.

Assistance

Union Parishad received 1 million TK in 2010/11 from LGSP. Village road and fence around the temple were constructed through Food for Work programme. Access road to main road and bridge were constructed by Hill District Council. NGOs of Grameen Bank, IDF, and CIDP are working in this village. About 20 households received micro finance from NGOs for agriculture. Villagers bought cows by Quick Impact Fund.



3.2.3 Bandarban

Kattali Para

(Bandarban Sadar Upazila)

History

20 households moved to this village about 85 years ago seeking a water resource. The present Karbari is the sixth generation. The Karbari position is not hereditary but selected by villagers. The village has 52 households now. Diarrhea was severely spread about 25 years ago and 7 villagers died.

Society

It is a paternal society. Property of parents is inherited by sons and daughters. 1 out of 22 clans of Marma peoples live in this village. Nowadays, young couples decide their own marriage. Inter-clan marriage is common. Villagers are Buddhist and have a temple in the village. Reciprocal practice is in common among villagers without money. Villagers celebrate religious events together. When a villager falls into trouble, other villagers help him/her. Villagers installed a well and maintain access village road commonly.

Village meetings

Villagers consult Karbari when a dispute arises. To consult the matter, he/she pays 400 TK as a fee. Karbari and elders mediate in an open space in the village through a committee. Monks are not involved in the mediation. Village meetings are held as necessary. 12 meetings are held in a year on average. Karbari, elders, and Union Parishad Members are important participants but monks do not participate in the meeting. PDC meeting is held monthly for development work.

Natural conditions

The overall geology of the area is near the boundary between Tipam group, Tipam Sandston formation of Neogene age and Dihing, DupiTila Formation of Pleiocene to Pleistocene age. Field survey identified silt stone with sand layer.

The village is located on a high hill in the riverhead area of Sang River tributary. Elevation is about 90m.

Socio-economy

Agriculture and forestry are main economic activities in this village. Rice is produced on flat land near the river. They use HYV seeds purchased from the market. Yield of rice per acre is about 2-2.4 tons. Hill slopes are used for jhum cultivation. They dam the stream, and use the water to irrigate rice cultivation. They use fertilizers and pesticides for HYV production. Use of local varieties is limited.

Villagers produce rice and turmeric on jhum. They believe they can reduce labor input for weed control by cultivating rice and turmeric together. They also cultivate ginger on slopes, but it is cultivated separately. They grow eggplants and pumpkins in jhum. Villagers usually plant fruit trees in homesteads but it is mainly for self-consumption. Commercial production of fruits such as mangoes, papayas, and bananas is limited. CHTBD once supplied free mango tree saplings.

Bodies of water for fishing are very limited. There is only one household who has a pond for fish culture. Villagers rear cattle, goats, pigs and poultry.

Since there is no primary school in this village, children are taught by a tutor. Due to lack of primary education, few children can go to secondary school.

There is no hospital or pharmacy near the village, so they need to go to Bandarban town for treatment.

Poverty

Agricultural products are consumed by the villagers themselves. Thus, income from agricultural products is minimal. Houses are built with bamboo and wood collected from hills.

They hardly eat meat and fish because they need to purchase these items from markets.

Vegetables are not always available, because they produce vegetables on small portion of land.

Livelihood

Main income of this village is day labor for agricultural work. Wage of labor is 200 TK for male and 150 TK for female. There are two villagers who earn salary as regular income. One works in a government office. The other works as a teacher.

Turmeric is one of the most important cash crops. Yield of turmeric is 2.8 tons per acre. It is usually sold after drying. Selling price of raw turmeric is 5,000 TK per ton, thus profit is 14,000 TK per acre. Production of dried turmeric is 560 kg per acre. Because the price of dried turmeric is 2,000 TK per 40 kg, income from dried turmeric is 28,000 TK per acre. Since the average area of turmeric production in this village is 0.5 acres, annual income from turmeric is estimated at 14,000 TK. Price of turmeric in 2010 was three times higher than in 2011. Ginger is also cultivated as cash crop.

Land ownership

15 out of 52 households have around 5 acre of land total. 4 households have about 0.5 acres of land, and rest of them is landless. Private land ownership is common in this village. Landless farmers depend on sharecropping of jhum. Share croppers usually pay 30% of products, or 3,000 TK for half acre of paddy land or 2,000 TK for horticulture.

Flat land is used for paddy cultivation if water is accessible. If there is not enough water then they cultivate vegetables. They use hill slopes only for jhum.

Because jhum land decreases year by year, they are forced to cultivate jhum land almost every year. Only households who have more than 5 acres maintain 2–15 year jhum cycle.

Infrastructure

From the main road to the village, there is unsurfaced union road. In a section of the road, a bridge and culvert are under construction. Presently vehicles cannot enter the village. The village road is maintained by villagers.

Safe drinking water

There is no improved water supply device and villagers are using stream water. There are 4 to 5 water collection points. During rainy season water collection is very difficult because the path is slippery.

Community infrastructure

Access from paved road to the village is very bad. A stream that flows through the village is utilized for irrigation.

There is one Buddhist temple. One sanitary latrine is established by the temple.

There is no market in village, or even in the nearest villages.

Public services

It is about 20 km to Union Parishad and about 15 km to Upazila. Villagers receive the same services as other areas, like old age allowance from Union Parishad. Sub Assistant Agricultural Officer rarely comes to the village. EPI is well conducted. One household one farm project is expected to be implemented.

Assistance

A bridge was constructed by Project Implementation Office. A box culvert and small dam were constructed by CHT Development Board. BRAC supports primary education through a local NGO. Eco-Development (NGO) plans to implement activities for mixed fruit garden support. Villagers bought seeds of turmeric and goats by Quick Impact Fund in 2011, and 200,000 TK out of 400,000 TK remains in the account.



Land for jhum cultivation



Standard housing in the village



Sorting work for turmeric



Stream is used for washing and bathing



Banana cultivation on slopes

Ranglai Chairman Para

(Bandarban Sadar Upazila)

History

25 households relocated to the village in 1994. Some households left the village seeking arable land and the number of households reduced to 19. 23 households moved to the village due to relocation in 2007. The present Karbari is the first generation. An outbreak of rats in 2007 damaged common forests.

Society

It is a paternal society. Property of parents is inherited by sons. 3 out of more than 40 clans of Mro people live in the village. Inter-clan marriage is common. Marriage within the same clan is prohibited. Originally Mro people were Buddhist but a new religion started about 30 years ago. 55% of people are followers of a new religion, Buddhists make up 40% of the population, and Christians 5%. Reciprocal practice is in common among villagers without money. Villagers celebrate religious events together. When a villager falls into trouble, other villagers help him/her.

Village meeting

Villagers consult elders and Karbari when a dispute arises. There is no custom to pay money as a fee for mediation. Village mediation rarely happens. Village meeting is held as necessary when a village event is held. PDC is formed in 2004 with 19 households. Future plans of PDC are to expand mixed fruit gardens, to maintain pre-primary education, and to facilitate small businesses.

Natural conditions

The overall geology of the area consists of Surma group, Boka Bill formation of Neogene age. Field survey identified silt stone mainly. From a geographical point of view, this area is classified as high hills and elevation is about 520 m. Most springs are located between 370 m to 450 m in elevation and V-shape valleys have formed from springs. The village is located on a ridge and elevation is 375 m to 410 m. The village has not been affected by natural disasters in the recent years.

Socio-economy

Jhum cultivation on steep slopes is the base of livelihood in this village. There is no flat land for paddy cultivation at all. They produce rice, pumpkin, radish, taro, til, chili, potato, sweet potato, cucumber, bean, turmeric, ginger and papaya. Main cash crops are turmeric, ginger, pumpkin, chili and papaya. Harvested cash crops are collected at a hut established by an NGO. A middleman visits the village to collect crops 3 times per week.

Villagers grow fruit trees with NGO assistance. In the mixed fruit garden, they produce mangoes, jackfruits, litchis and others. Fruits are also sold through a middleman.

They usually rear pigs, but few rear goats and cattle because they cannot produce fodder. Pigs and poultry are mainly consumed in the village. There is no fishery practice due to lack of water body.

A primary school is 20-minute walk from the village. All children go to primary school. 10 students go to secondary school. Only 5 villagers have graduated from high school.

A community clinic is also in 20 minute walking distance from the village. Since there is no pharmacy in village, they go to the market near the community clinic.

They hold religious festivasl three times in a year, in January, March and April.

Poverty

The village's income source is production of jhum and fruit gardens, thus it is unstable. When they do not have production, they earn cash by day labor.

Daily meals are mainly rice and vegetables. Meat and fish are available once or twice in a month.

Houses are built with bamboo and wood collected from hills. Structure is made of wood, and wall and floors are made of bamboo.

Villagers usually do not use toilets, but there are 5 sanitary latrines.

Livelihood

Main income is from jhum production and fruits. Ginger, turmeric and papaya are major cash crops. The selling price of ginger is 2,000 TK per 100 kg, and turmeric is 5,000 TK per 100 kg.

Day labor is also an important income source. Wage is 150 TK for male and 100TK for female. 5 villagers have salary. One works in a school, and four work in NGOs.

Expenditure of one family is about 3–5,000 TK. There are no families receiving remittance.

Land ownership

Average landholding is 1 or 2 acres. These lands are usually utilized for fruit plantation. There is no ownership document. Every family uses land around the village. The size of land use is different from family to family, but usually 1–5 acres.

Due to the lack of land, villagers cannot maintain enough time for jhum. They used to maintain a minimum 7 year cycle, now shortened to every 1–3 years.

Infrastructure

There is a brick road from main road to the entrance of the village and concrete stairs in the village constructed by CHT Regional Development Board.

There is no electrification.

Safe drinking water

There is a GFS with two public taps which was constructed by CHT Regional Development Board.

Water collecting point of the GFS is 1km away from village. Water is supplied by gravity though a water GI pipe. The villagers can collect water from public taps for 24 hours.

Regular maintenance is carried out by villagers and paid with their contributions.

Community Infrastructure

Paved road is available near the village. Concrete stairs was built by budget of the union.

Electricity is not available, but there are some households which installed solar panels of grameen Shakti.

There is a building for religion.

Market is in 20-minute walking distance from the village.

Public services

It is about 14 km to Union Parishad and about 20 km to Upazila. Villagers receive the same services as other areas, like old age allowance from Union Parishad. This village is on a

very steep slope. That is why steps were constructed by Union Parishad with the budget of 80,000 TK. Gravity flow system was installed by CHTDB with the budget of 1.5 million TK. Sub Assistant Agricultural Officer rarely comes. EPI is well conducted. There is a community clinic about 1.5 km away.

Assistance

Union Parishad received 500,000 TK last year from LGSP. Total of 500,000 TK was provided by Quick Impact Fund. Villagers constructed a community center and set up mixed fruit gardens. GRAUS (NGO) facilitates PDC activities. BNKS (NGO) runs a preprimary school with the fund of Save the Children. CCDP (NGO) provides micro finance. NGOs facilitate linkage between government agencies and villagers. Utilizing UDCCM is planned for the linkage.



3.2.4 Cox's Bazar

Kutu Palong Para

(Ukhia Upazila)

History

The origin of this village goes back to 6th Century. Rakhain peoples came to the village in 18th Century. After Rakhain people left, Buddhists and Muslims of Chittagong came in the 19th Century and still live today. 1,700 households live in the village now. There is Rohingya refugee camp in the village. The village is cyclone-prone and suffered severe damage in 1991.

Society

It is a paternal society. Property of parents is inherited by sons and daughters according to Islamic law. About half of the villagers are Muslim and the other half are Buddhist. About 50 households are Hindu. Property of parents is inherited by son among Buddhists. It is common for parents to arrange marriages. Reciprocal practice was common among villagers 20 years ago but villagers pay money for help nowadays. Even though unity seems weakened, when a villager falls into trouble, other villagers help him/her. Villagers celebrate religious events together.

Village meeting

Villagers consult elders when a dispute arises. There is no custom to pay money as a fee for mediation. 1 to 2 village mediations are conducted in a year on average. Villagers go to Union's Parishad Chairman when the dispute is beyond the capacity of villagers. Village meetings are held as necessary when a village event is conducted. When Union Parishad Chairman comes to the village, villagers get together and discuss various issues including development work. A Muslim society has 7 traditional social units and a Buddhist society has 6 traditional social units. Each social unit has Sardar selected by villagers.

Natural conditions

The overall geology of the area consists of DupiTila formation of Pleiocene and Pleistocene age. From a geographical point of view, this area is classified as low foothills with flat land. Field survey identified sand stone from low hills. Therefore residential area is located at the base of hill slopes. Asmall river flows through the area.

Socio-economy

Agriculture is the main economic activity. Main production is rice and some vegetables and fruits. They use HYV rice such as BR-11, 28, 32, 33. They also use their own seeds. Average yield of rice is 1.6–2.2 tons per acre. Production using own seeds is 1.6 tons per acre. Produced vegetables include potatoes, chilis, eggplants, tomatoes, radishes, beans, pumpkins and others. Scale of production is very small, so they are self-consumed. Villagers produce fruits in their homesteads such as mango, jackfruit, banana, water melon, pineapple, papaya and guava.

An important cash crop is betel leaf and nut.

Many households keep cattle for mainly plowing. They sell cattle only in Eid festival. There are goats and chickens but their numbers are minimal. Only households that have their own pond culture fish.

There is a primary school and a secondary school in the village. Therefore, all children go to primary school, and graduate. 80% of students go to secondary school. 60% students graduate secondary school and 40% students go to high school. Students who go to

university are only 5%.

There is a community clinic in the village. Usually people use this clinic for the initial treatment. There is hospital run by MSF which provides service for Rohingya people. Local community can also receive medical service in MSF hospital.

50% of population is Muslim, and another 50% is Buddhist. Thus, there are religious festivals for both religions.

Poverty

Because many households depend on share cropping, income is not stable. Rice and vegetables are main items to be consumed as daily meals. T hey can eat meat or fish once or twice in a month.

Houses are made by dirt walls and tin-sheds. Sanitary latrines are not used.

Livelihood

Betel leaf is the main cash crop. Production cost such as fertilizers, pesticides, shed and labor for 0.1 ha land is about 82,000 TK. Profit from the sale of betel leaf is 48,000 to 120,000TK. Since betel leafs are sometimes destroyed by insects, risk is very high in spite of high profit. They utilize loan programmes of Grameen Bank and other BRAC for betel leaf production.

Day labor is also important income source, especially for landless household. Wage of day labor is 300 TK for male, and 150 TK for female.

Expenditure per person per month is estimated at 1,000 TK.

200 villagers are thought to be working in foreign counties. Thepeople are from large farming families.

Land ownership

70% of households are landless. Most of other households usually have less than 1 acre. Few households have more than 2 acres of land.

Generally speaking, two thirds of the land is utilized for paddy cultivation. The rest of the land is used for cultivation of betel leaf, vegetables and fruits.

Infrastructure

A 671 m-long Union road was improved by AFC and financially supported by the Netherlands and Spain.

There is no irrigation facility. Villagers source irrigation water from a small channel by their own low lift pump. Power line connection is available but less than 10% of households are connected.

Safe drinking water

There are STWs and Ring wells. Most households having their own wells or use nearby wells. Therefore villagers are not facing a water problem. I n the western part of the village, there is a small river that villagers use for bathing and washing.

Community infrastructure

Road communication in the village is good. There is a market and small grocery shops in the village.

Mosques and Buddhist temples are also available.

Public services

It is about 5 km to Union Parishad and Upazila. Villagers receive the same service as other areas like old age allowance from Union Parishad. Sub Assistant Agricultural Officer comes and provides technical advice. EPI is well conducted in community clinic but medical services are not provided in community clinic. Villagers go to Upazila Health Complex for medical services.

Assistance

Help CXB (NGO) provided assistance to domestic problems up to 2010 as a project. Concern Worldwide worked on gender issue. CODEC supports pre-primary school. ACF constructed a village road. UNICEF constructed a playground and UNHCR constructed the high school office.



Matha Bhanga Para

(Teknaf Upazila)

History

The origin of the village dates to before British rule. 200 households live in the village now. The village is located along the seashore with hills in backside. Leader of the village is a Union Parishad Member. The village is cyclone-prone and had severe damage in 1991 and 1994. An earthquake in 2009 caused landslides that damaged arable land. The village is very peaceful and stable.

Society

It is a paternal society. Property of parents is inherited by sons and daughters according to Islamic law. Only 1 household is Hindu. It is common for parents to arrange marriages. Reciprocal practice is in common among villagers without money. When a villager falls into trouble, other villagers help him/her. Weddings and funerals are conducted as social events. Villagers celebrate religious events together. Villagers also work together to construct simple community infrastructure.

Village meeting

Villagers consult elders and Union Parishad Member when a dispute arises. There is no custom to pay money as a fee for mediation. However, if Union guards distribute a notice among stakeholders, 50 TK is required for the work. 1 to 2 mediations are held in a month on average. Villagers submit the application for mediation to Union's Parishad Chairman when the dispute over the capacity of villagers. Village meeting is held as necessary when a village event is conducted or to maintain the peace and order in the village. 5 to 6 village meetings are held in a year on average. Development work is discussed at Union Parishad meetings. There are 7 traditional social units and each unit has Sardar selected by villagers.

Natural conditions

The overall geology of the area consists of Surma group, Boka Bill formation of Neogene age. Field survey identified silt stone and few sand layers mainly.

From a geographical point of view, this area consists of high hills, terrace at the base of high hills, and coastal plains. On the high hill slopes, V-shape valleys are formed.

Residential area is located in terraces and coastal plains.

Socio-economy

Economic activities in this village based on agriculture and fishery. In agriculture, they produce rice in rainy season. During dry season, horticulture by using stream water from hills is the main activity. For paddy cultivation, they use HYV such as BR-16, 28, 32, and 33. HYV seeds are renewed every 2–3 years. However, yield per acre is only 0.5 tons. Most of rice production is for self-consumption. For horticulture, they produce potato, bean, chili, cucumber, eggplant, tomato, lady's finger and radish. Some parts of vegetable production are sold in local market.

Fruit production is very limited, but mango and jackfruit are mainly cultivated. Watermelon is very important as a cash crop in this area. Some households rent land in the reserved forest, and produce fruits. Banana and jackfruit are damaged by elephants sometimes.

Another important cash crop is betel leaf and nut produced in specially built sheds. Many households use 0.1–0.2 acres of land for betel leaf cultivation. Betel nut trees are planted in homesteads and harvested once in a year.

Because the village is located by the seashore, about 30% of households depend on fishery. Of the 30%, 10% of households have their own engine boat. Other households work in fishery.

Cattle are kept for plowing. Other domestic animals such as goats and chickens are also reared for income generation.

There is a primary school. All children go to school, but 75% graduate. Secondary school is located in a neighboring village. Not many students go on to higher education in this village.

There is no community clinic. Hospitals are also not available in this area. Villagers need to go to Teknaf for medical treatment. There is a pharmacy in the nearest market.

Most of villagers are Muslim; thus important events in village are rituals related to Islam, especially Eid festival.

Poverty

Main income is from betel leaf, betel nut and watermelon. Because the scale of landholding is small, production is also limited. Monthly expenditure of standard household with 7 family members is 100,000 TK to 120,000 TK. Since they cannot cover this expenditure by agricultural products, they earn cash by day labor.

They eat mainly rice and vegetables, but fish is often available. They eat meat once a month. Houses are made with dirt walls and tin sheds.

Livelihood

Income source is betel leaf and nut. Villages need a lot of input to cultivate betel leaf such as fertilizers, pesticides and sheds. Profit is higher than other crops, but if there is damage from pests, prices dramatically fall. In other words, betel leaf cultivation is very high risk. Average profit from betel leaf is 100,000 TK per 0.2 acres.

Water melon is also a high profit cash crop. Villagers can earn 100,000–150,000 TK per 2 acres.

Land ownership

40% of villagers are landless. Landholding of majority of villagers is less than 1 acre. Few households have more than 5 acres of land. Thus, many families depend on sharecropping. They cultivate rice during rainy season and horticulture during dry season.

20 households are involved in participatory forest programme. They rent 50 ha of land from Forestry Office, and grow trees.

Infrastructure

The Upazila road is neaby the village. Village road is maintained by villagers.

There is small dam made of clay at streams to collect and supply drinking and agricultural water by individual pipes. Beside the main road, there is a power line, to which 30% of villagers are connected.

Safe drinking water

In the village, there are ring wells, STWs and IFG (Infiltration Gallery). Households have no water supply facility; they collect water from a nearby water device. Therefore, villagers are not facing a problem to collect water. Some groundwater is saline and/or contains iron. Some private water devices have no hygienic platforms.

Community infrastructure

Mosque and madras are established by community.

They have small water tank for horticulture farming. Irrigation system is also established by community contribution.

Public services

It is about 6 km to Union Parishad and about 18 km to Upazila. Villagers receive the same service as other areas like old age allowance from Union Parishad. Sub Assistant Agricultural Officer rarely comes. EPI is well conducted. There is no community clinic nearby. Villagers go to Upazila Health Complex for medical services.

Assistance

SHED (NGO) works on nutrition with support of CARE. BRAC supported sanitation and safe drinking water programmes, and continues pre-primary education. Union Parishad received 400,000 TK in 2009/10 from LGSP but no funding in 2011/12 so far.



3.3 Issues to be Addressed

One of the most hindering constraints in CHT is hard accessibility to villages. It is very difficult to deliver public services to villagers because villagers are scattered in hilly areas. Utilization of local NGOs is one way to ensure outreach to villagers. Expanded Programme on Immunization (EPI) is well conducted in the area but other public services on safe drinking water, education, agricultural extension, and so on are very limited due to the constraints. Capacity development of Hill District Councils to overcome the constraints is needed to improve public services.

Deforestation is another urgent issue. It is considered that watershed management should be introduced. Diversification and improvement of livelihoods is considered to be a key factor for sustainable development. Attention should be paid especially to villages in high land areas because the area has still little support from outside service providers.

CXB has also limited accessibility to villages because it is located between hilly area and sea. EPI is well conducted in CXB too but other public services have limited outreach. However, CXB is better than CHT in terms of accessibility of government field workers to villages. Therefore, linkage between government agencies and villagers could be enhanced through Union Development Coordination Committee Meeting (UDCCM). On the other hand, rapid and uncoordinated tourism development might have some negative impact on natural resources and rich traditional society in the region, which are the most important values for tourism.

Diversification and improvement of livelihoods and access to safe drinking water are considered to be one of the urgent issues in both CHT and CXB. Linkages between government agencies and villagers should be enhanced in the process of development activities.

4. Local Industry Profile

4.1 Khagrachhari

4.1.1 Agro-based Industries

Agriculture

As described in the previous chapter, agriculture is the foundation of the economy in Khagrachhari. According to the interview from the Khagrachhari Hill District Council, they claimed that agriculture is the footing in developing industries in this region. Thus, we will demonstrate the features of agricultural production in Khagrachhari through statistical data and information collected by interviews. Tables 4-1, 4-2, 4-3 and 4-4 show the cultivated areas of rice¹, other major crops, vegetables and fruits. As shown in Figure 4-1, comparing the rate of cultivated area in Khagrachhari to the total national area for each category, the ratios of rice cultivation is low, but comparatively higher in other major crops, vegetables and fruits. The area of land cultivated for fruits is especially remarkable. Hilly geographic feature in Khagrachhari, which may be the same in all over CHT, is the factor confineing rice cultivation which requires plain land.

Table 4-1: Area of Rice Cultivation in Khagrachhari

National	Kagrachari	Aus		Aman		Boro	
Cultivated Area	Iltivated Area Cultivated Area	Local	HYV	Local	HYV	Local	HYV
26,881,000	87,154	1,248	4,643	3,671	74,090	-	3,502

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

National Cultivated Area	Kagrachari Cultivated Area	Maiz	Til	Tarmaric	Ginger	Rabi Chili
711,792	8,177	422	238	4,713	2,145	659

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Table 4-3: Area of Vegetable Cultivation in Khagrachhari

National	Kagrachari	Lady's			Rabi			Sweet
Cultivated Area	Cultivated Area	Finger	Jinga	Taro	Pumbkin	Tomato	Beans	Potato
308,512	8,340	438	580	5,181	526	466	494	655

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Table 4-4: Area of Fruits Cultivation in Khagrachhari

National Cultivated Area	Kagrachari Cultivated Area	Banana	Pinapple	Mango	Papaya	Jackfruit	Wood Apple
2,364,530	88,780	3,775	1,695	2,164	1,951	77,994	1,201

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

¹ There are tree types of rice cultivation in Bangladesh, namely Aman and Aus in rainy season and Boro in dryseason.



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-1: Ratio of Selected Items' Cultivated Area to National Cultivated Area

Figure 4-2 demonstrates ratio of crop categories at the national level and in Khagrachhari. It shows only selected items, so does not describe comprehensive characteristics of cultivation patterns. However, it can give us an idea about basic features of the cropping pattern in Khagrachhari. For example, at the national level, it is clear that rice cultivation occupy extremely high rate in the cultivation area; meanwhile, rice cultivation is only 45%, and fruits account for about the same ratio as rice in Khagrachhari.



Figure 4-2: Ratio of Cultivated Area of Main Crops

Tables shown below are to compare productivities of selected crops. Table 4-5 shows the productivity of different types and varieties of rice in Khagrachhari and at the national level. Though cultivated area is smaller than national average, productivities are approximately the same as the national level.
District	Rice	Variety	Item	2008/09	2009/10	National (2009/10
			Area (acre)	1,380	1,248	832,230
		Local	Production (ton)	771	668	393,434
	A 110		Yield (ton/acre)	0.6	0.5	0.5
	Aus		Area (acre)	5,060	4,643	1,599,462
		HYV	Production (ton)	4,093	3,714	1,315,693
			Yield (ton/acre)	0.8	0.8	0.8
	Amon		Area (acre)	3,270	3,671	3,494,580
		Local	Production (ton)	2,704	2,741	2,236,737
Khagraahari			Yield (ton/acre)	0.8	0.7	0.6
Kilagiacilali		HYV	Area (acre)	69,250	74,090	9,323,203
			Production (ton)	73,231	84,461	9,403,633
			Yield (ton/acre)	1.1	1.1	1.0
			Area (acre)	-	-	265,220
		Local	Production (ton)	-	-	214,550
	Poro		Yield (ton/acre)	-	-	0.8
	B010		Area (acre)	3,264	3,502	9,671,268
		HYV	Production (ton)	5,054	5,800	14,622,485
			Yield (ton/acre)	1.5	1.7	1.5

Table 4-5: Productivity and Cultivated Area of Rice in Khagrachhari

Table 4-6 indicates productivities of other major crops. Although other major crops are cultivated mainly as cash crops, its productivities are lower than the national level. For instance, productivity of maize and til (sesame) are about half of the national average productivity. Chili and ginger are widely produced in Khagrachhari and among the main income source for farmers, but the productions per acre are less than national average. Turmeric is a major cash crop in CHT, and it is produced in the especially hill slopes where tribal people live. The table shows high productivity of turmeric compared to the national average though it is produced with little or without input such as fertilizer and pesticide.

Name of Crops	Items	2008/09	2009/10	National (2009/10)
	Area (acre)	397	422	375,628
Maiz	Production (ton)	380	411	887,391
	Yield (ton/acre)	0.96	0.97	2.36
	Area (acre)	253	238	87,850
Til	Production (ton)	57	46	32,306
	Yield (ton/acre)	0.23	0.19	0.37
	Area (acre)	4,570	4,713	56,203
Turmaric	Production (ton)	13,408	14,010	117,081
	Yield (ton/acre)	2.93	2.97	2.08
	Area (acre)	2,071	2,145	22,403
Ginger	Production (ton)	5,741	6,316	74,841
	Yield (ton/acre)	2.77	2.94	3.34
	Area (acre)	665	659	169,708
Rabi Chili	Production (ton)	206	206	90,042
	Yield (ton/acre)	0.31	0.31	0.53

Table 4-6: Productivities of Other Major Crops in Khagrachhari



Figure 4-3: Productivities of Other Major Crops in Khagrachhari

In Khagrachhari, people produce various vegetables on hill slopes by shifting cultivation. Table 4-7 shows the main vegetables cultivated in Khagrachhari. Productivity of selected vegetables is approximate to the national average, but only the yield of pumpkin produced widely throughout CHT is low.

				National
Name of Vegetable	Items	2008/09	2009/10	(2009/10)
	Area (acre)	438	438	25,204
Lady's Finger	Production (ton)	753	778	42,366
	Yield (ton/acre)	1.72	1.78	1.68
	Area (acre)	781	580	23,039
Jinga	Production (ton)	1,337	1,098	44,064
	Yield (ton/acre)	1.71	1.89	1.91
	Area (acre)	4,988	5,181	58,736
Taro	Production (ton)	1,965	21,164	224,546
	Yield (ton/acre)	0.39	4.08	3.82
	Area (acre)	508	526	24,908
Rabi Pumpkin	Production (ton)	1,579	1,628	124,534
	Yield (ton/acre)	3.11	3.10	5.00
	Area (acre)	432	466	58,854
Tomato	Production (ton)	1,371	1,435	190,213
	Yield (ton/acre)	3.17	3.08	3.23
	Area (acre)	479	494	40,992
Beans	Production (ton)	921	947	88,581
	Yield (ton/acre)	1.92	1.92	2.16
	Area (acre)	644	655	76,779
Sweet Potato	Production (ton)	2,102	2,134	306,633
	Yield (ton/acre)	3.26	3.26	3.99

Table 4-7: Cultivated Area and Productivities of Vegetables in Khagrachhari



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-4: Productivities of Vegetable in Khagrachhari and Bangladesh

Banana and pineapple are major fruits grown on hill slopes in CHT. However, as shown in Table 4-8 and Figure 4-5, the yield of both banana and pineapple are much less than the national yield. Though banana is one of main income source for Khagrachhari farmers, the production does not reach even half of the national average.

				National
Name of Vegetable	Items	2008/09	2009/10	(2009/10)
	Area (acre)	3,427	3,775	133,305
Banana	Production (ton)	10,366	10,278	818,254
	Yield (ton/acre)	3.02	2.72	6.14
	Area (acre)	1,601	1,695	39,583
Pineapple	Production (ton)	5,699	6,399	234,493
	Yield (ton/acre)	3.56	3.78	5.92

Table 4-8: Productivities of Banana and Pineapple in Khagrachhari

Source: Yearbook of Agricultural Statistics of Bangladesh-2010



Figure 4-5: Yields of Banana and Pineapple in Khagrachhari

Comparing to banana and pineapple, the yield of other major fruits are high as shown in Table 4-9. As Figure 4-6 indicates, for example, production of jackfruit in Khagrachhari is 40% higher than national average. Though we could not observe cultivation of wood apple in CHT, it shows high productivity. Papaya's production is almost the same as the national level, but production of mango is lower.

		Area Under Garden (acre)		Average Yield Per Fruit Bearing Tree (kg)	
	Fruit	2008-09	2009-10	2008-09	2009-10
Mongo	Khagrachari	651	839	25	26
Mango	National	76,715	79,066	67	81
D	Khagrachari	105	103	16	18
Papaya	National	2,750	2,790	23	20
Icalifinit	Khagrachari	2,673	2,719	219	228
Jackfruit	National	22,814	25,166	138	135
	Khagrachari	N/A	N/A	44	73
wood Apple	National	220	177	52	51

Table 4-9: Productivity of Other Major Fruits in Khagrachhari

Source: Yearbook of Agricultural Statistics of Bangladesh-2010



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-6: Productivity of Other Major Fruits

Table 4-10 shows the extension activities by the Department of Agriculture Extension (DAE). It mainly conducts activities for the extension of improved varieties. According to the field visit to the rural area, it is assumed that extension services do not reach to remote areas.

Table 4-10: Projects in DAE

Office	Name	Duration	Budget	Activities
Dept of	Improved seed of Rice, Wheat and	2011-2012	-	Demonstration of seeds
Agriculture	Jute, production, Storage &			in different upazila.
Extension	distribution project at farmers level.			Seed preservation
(DAE)	Mix fruit garden	2004-	-	Distribution of fruits
	-			grafting sapling

Source: Interview with DAE

Livestock

According to the hearing from the Department of Livestock (DoL) in Khagrachhari, it has advantage in livestock as follows: (1) long term cool weather which prevents livestock from diseases, (2) preferable soil and rain fall for fodder production, (3) less infectious diseases due to scattered settlement. Though it has advantages mentioned above, livestock production is very low as shown in Table 4-11. One of the challenges for DoL in Khagrachhari is lack of mobility to outreach remote areas. In order to overcome the difficulty, they propose to set up a livestock service center where vetenarians can provide services such as diagnosis, vaccine, artificial insemination and extension of new varieties. Since approximately 80% of animal products consumed in Khagrachhari are imported from out of district, there is good opportunity for producing meats and milk in Khagrachhari.

Livestock	Use of Livestock	Khagrachhuri	National	Share
	Commercial	2,241	194,154	1.15%
Cattle & Buffaloes	Subsistance	187,231	24,941,184	0.75%
	Total	189,472	25,135,338	0.75%
	Commercial	12,587	881,507	1.43%
Goats & Sheep	Subsistance	142,085	16,577,554	0.86%
	Total	154,672	17,459,061	0.89%
	Commercial	147,003	21,809,649	0.67%
Fowls & Ducks	Subsistance	1,176,011	166,588,650	0.71%
	Total	1,323,014	188,398,299	0.70%
	Commercial	815	115,410	0.71%
Pigeons	Subsistance	27,245	10,764,513	0.25%
	Total	28,060	10,879,923	0.26%

Table 4-11: Rate of Animal Production in Khagrachhari to National Production

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Fishery

As it will be explained in the next chapter, CHT has lack of water resource in general. Thus, this area has less opportunity for fishery. As is shown in Table 4-12, fish production in Kagrachhari is small and only of beel. According to field level observation, it is said that there are some fish culture in small ponds for self-consumption.

Table 4-12: Fig	sh Production	by Water	Bodies in	Khagrachhari
	Shiri oduction	by match	Douics in	ranagraorman

		(ton)
	Kagrachhari	National
River	N/A	138,016
Beel	10	79,200
Flood Land	N/A	879,513
Pond	N/A	912,178
Baor	N/A	5,038
Shrimp Farm	N/A	145,585
Total	10	2,159,530

Forestry

Rubber tree and teak plantation can be observed on road side hill slope in Khagrachhari. Some areas of state forest are leased out for plantation, but basically managed by the Department of Forest. As it is shown in Table 4-13, area of forest in Khagrachhari accounts for 8.63% of the total forest area². The forest in Khagrachhari mainly categorized as Un-classified state forest (USF) shares a quarter of total USF. Although there are a lot of potentials in forestry in Khagrachhari, there are obstacles to develop this sector due to the land issue.

			Share of
Type of Forest	Khagrachhari	National	Khagrachhari
Protected Forest			
(20th Ammendment)	88,492.83	3,020,047.88	2.93%
Protected Forest			
(4 & 6th Ammendment)	7,342.67	1,457,171.47	0.50%
Reserved Forest	0.00	91,381.89	0.00%
Acquired Forest	0.00	20,848.40	0.00%
Vested Forest	0.00	9,491.97	0.00%
Un-classfied Forest	4,202.76	42,847.51	9.81%
Total Forest Area Controled by			
Forestry Dept.	100,038.26	4,641,789.12	2.16%
Un-classfied State Forest	454,077.95	1,716,609.32	26.45%
Khas Forest Area	0.00	59,510.84	0.00%
Total Forest Area	554,116.21	6,417,909.28	8.63%

Table 4-13: Area of Forest by Type and Share of Khagrachhari

Source: Yearbook of Agricultural Statistics of Bangladesh-2010



Figure 4-7: Ratio of Forest by Type in Khagrachhari

² Types of forest are described in page 2-2.



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-8: Ratio of Forest by Type in Bangladesh

4.1.2 Particularity of Local Industries in Khagrachhari

As we have described above, agriculture is the foundation of local industries in Khagrachhari, and it has high potential in horticulture and fruit gardening on hill slopes. Animal production is still limited, but development of livestock production to acquire a share of the local market will be worthwhile. Potential of fishery is minimal due to lack of water bodies. Only in the context of watershed management, fish culture will be possible to develop. Deforestation will be an urgent challenge in forestry sector. Though Khagrachhari has a large forest area, there are historical, political and administrative issues related to land, so we need a long term perspective for development of forestry in this area.

4.2 Rangamati

4.2.1 Agro-based Industries

Agriculture

Historically and geographically, Rangamati has been a focal point in CHT. Thus, industrial investment was flung into the district by governments such as Kaptai Dam, paper mill and so on. Due to the Kaptai Lake which occupies most of Rangamati, fishery should be considered as having high potential. We will describe the situation of these industries, yet we again start from agriculture, because it is still the foundation of income source for many people in Rangamati. Tables 4-14, 4-15, 4-16 and 4-17 show cultivated area of rice, other major crops, vegetable and fruits. As we have already seen in Khagrachhari, rice cultivation is very minimal, and other major crops, vegetable and fruits cultivation are the main crops in Rangamati. In Rangamati, cultivated area of other major crops such as maize, til and turmeric are larger than vegetables. On the other hand, the ratio of cultivate area of selected fruits to the national total is highest in the southeastern region (see Figure 4-9).

National	Rangamati	A	Aus		Aman		Boro	
Cultivated Area	Cultivated Area	Local	HYV	Local	HYV	Local	HYV	
26,881,000	45,394	11,652	3,466	831	23,091	-	6,354	

Table 4-14: Cultivated Area of Rice in Rangamati

National Cultivated Area	Rangamati Cultivated Area	Maiz	Til	Tarmaric	Ginger	Rabi Chili
711,792	14,981	693	3,489	5,949	3,671	1,179

Table 4-15.	Cultivated	Area of	Other Ma	ior Crons	in Rangamati
Table 4-15.	Cultivateu	Alea Ul		ju ciups	in Kanyaman

Table 4-16: Cultivated Area of Vegetable in Rangamati

National Cultivated Area	Rangamati Cultivated Area	Lady's Finger	Jinga	Taro	Rabi Pumbkin	Tomato	Beans	Sweet Potato
308,512	5,144	421	755	1,774	598	545	584	467

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Table 4-17: Cultivated Area of Fruits in Rangamati

National Cultivated Area	Rangamati Cultivated Area	Banana	Pinapple	Mango	Papaya	Jackfruit	Wood Apple
2,364,530	95,772	9,305	3,157	2,164	1,951	77,994	1,201

Source: Yearbook of Agricultural Statistics of Bangladesh-2010



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-9: Ratio of Major Crops of Rangamati in National Cultivated Area

As we have seen in Khagrachhari, rice cultivation area accounts for almost 90% of selected crops; meanwhile, fruits occupy 60% in Rangamati (Figure 4-10), and rice cultivation accounts for only 28%. Comparing with Khagrachhari, cultivable land for rice is more limited due to Kaptai lake and hills.



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-10: Ratio of Cultivated Area of Major Crops in Rangamati and Bangladesh

Though area of rice cultivation is extremely limited, productivity of rice is normal except local variety of aus rice. In spite of low productivity, area of local aus cultivation is four times larger than HYV cultivation in Rangamati.

District	Rice	Variety	Item	2008/09	2009/10	National (2009/10
			Area (acre)	12,845	11,652	832,230
		Local	Production (ton)	7,063	6,363	393,434
	Aus		Yield (ton/acre)	1.82	1.83	2.12
	Aus		Area (acre)	3,500	3,466	1,599,462
		HYV	Production (ton)	2,902	2,840	1,315,693
			Yield (ton/acre)	1.21	1.22	1.22
	Amon		Area (acre)	750	831	3,494,580
		Local	Production (ton)	601	610	2,236,737
Pangamati			Yield (ton/acre)	1.25	1.36	1.56
Kangamati		HYV	Area (acre)	23,325	23,091	9,323,203
			Production (ton)	21,732	24,927	9,403,633
			Yield (ton/acre)	1.07	0.93	0.99
			Area (acre)	-	-	265,220
		Local	Production (ton)	=		214,550
	Boro		Yield (ton/acre)	-	-	1.24
	BOIO		Area (acre)	6,209	6,354	9,671,268
		HYV	Production (ton)	11,380	12,174	14,622,485
			Yield (ton/acre)	0.55	0.52	0.66

 Table 4-18: Productivity and Cultivated Area of Rice in Rangamati

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Other major crops are the source of income for majority of the communities, yet the productivities of many crops are comparatively low. Ginger is the only crop whose productivity is higher than national standard (see, Table 4-19). Turmeric is one of the cash crops widely cultivated in CHT; yet, its production is about 20% lower than national average.

Name of Crops	Items	2008/09	2009/10	National (2009/10)
	Area (acre)	1,491	693	375,628
Maiz	Production (ton)	1,442	706	887,391
	Yield (ton/acre)	0.97	1.02	2.36
	Area (acre)	3,538	3,489	87,850
Til	Production (ton)	956	945	32,306
	Yield (ton/acre)	0.27	0.27	0.37
	Area (acre)	5,852	5,949	56,203
Turmeric	Production (ton)	9,041	9,187	117,081
	Yield (ton/acre)	1.54	1.54	2.08
	Area (acre)	3,600	3,671	22,403
Ginger	Production (ton)	15,628	15,588	74,841
	Yield (ton/acre)	4.34	4.25	3.34
	Area (acre)	1,192	1,179	169,708
Rabi Chili	Production (ton)	592	595	90,042
	Yield (ton/acre)	0.50	0.50	0.53

Table 4-19: Productivity and Cultivated Area of Other Major Crops in Rangamati

Source: Yearbook of Agricultural Statistics of Bangladesh-2010





Name of Vegetable	Items	2008/09	2009/10	National (2009/10)
	Area (acre)	411	421	25,204
Lady's Finger	Production (ton)	586	594	42,366
	Yield (ton/acre)	1.43	1.41	1.68
	Area (acre)	736	755	23,039
Jinga	Production (ton)	1,284	1,340	44,064
	Yield (ton/acre)	1.74	1.77	1.91
	Area (acre)	1774.00	1774.00	58,736
Taro	Production (ton)	4988.00	3580.00	224,546
	Yield (ton/acre)	2.81	2.02	3.82
	Area (acre)	590.00	598.00	24,908
Rabi Pumpkin	Production (ton)	1938.00	1968.00	124,534
	Yield (ton/acre)	3.28	3.29	5.00
	Area (acre)	557.00	545.00	58,854
Tomato	Production (ton)	1189.00	1062.00	190,213
	Yield (ton/acre)	2.13	1.95	3.23
	Area (acre)	574.00	584.00	40,992
Beans	Production (ton)	860.00	839.00	88,581
	Yield (ton/acre)	1.50	1.44	2.16
	Area (acre)	530.00	467.00	76,779
Sweet Potato	Production (ton)	1863.00	1676.00	306,633
	Yield (ton/acre)	3.52	3.59	3.99

Table 4-20: Productivity and Cultivated Area of Vegetable in Rangamati

According to the interviews from communities, vegetables are produced mainly for selfconsumption, or sale inside of communities, and surplus of vegetables are minimal income source. Cultivated area of vegetables accounts for high ratio in Rangamati; however, as shown in Table 4-12, productivity of vegetable is lower than national standard. In particular, the yield of taro and pumpkin are a half or one third of national productivity.



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-12: Yield of Vegetables in Rangamati

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

As is mentioned above, fruit has the highest ratio in the cultivated area in Rangamati. Moreover, fruit also shows comparatively high productivity rate in Rangamati. As is demonstrated in Table 4-21 and Figure 4-13, pineapple, papaya, jackfruit and wood apple is higher in productivity than national productions. Banana and mango's productivity is lower than national level as it was in Khagrachhari.

				National
Name of Vegetable	Items	2008/09	2009/10	(2009/10)
	Area (acre)	9,110	9,305	133,305
Banana	Production (ton)	44,562	40,874	818,254
	Yield (ton/acre)	4.89	4.39	6.14
	Area (acre)	3,133	3,157	39,583
Pinapple	Production (ton)	22,087	22,209	234,493
	Yield (ton/acre)	7.05	7.03	5.92

Table 4-21: Productivity of Banana and Pineapple

Source: Yearbook of Agricultural Statistics of Bangladesh-2010



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-13: Productivity of Banana and Pineapple in Rangamati

					manyan
		Area Und	er Garden	Average Yield Per Fruit	
		(ac	ere)	Bearing '	Tree (kg)
	Fruit	2008-09	2009-10	2008-09	2009-10
Manaa	Rangamati	332	478	52	63
Mango	National	76,715	79,066	67	81
D	Rangamati	140	147	20	26
Papaya	National	2,750	2,790	23	20
T1-614	Rangamati	1,055	1,388	203	220
Jackfruit	National	22,814	25,166	138	135
Wood Apple	Rangamati	12	9	58	62
Wood Apple	National	220	177	52	51

Table 4-22: Productivity and Cultivated Area of Other Fruits in Rangamati



Figure 4-14: Productivity of Fruits in Rangamati

Table 4-23 shows project implemented by Department of Agriculture Extension. The contents of projects are mainly extension of improved varieties.

Table 4-23: Projects in DAE

No.	Name	Duration	Budget	Activities
1	Improved seed production, storage & distribution project at farm level	5 years (Extended)	360,000	240 demonstration farms (BRRI Dhan- 28=220, BRRI Dhan-50= 20)

Source: Interview to officer in Dept. of Agricultural Extension

Livestock

There is not much commercial production in the livestock sector. As can be seen in Table 4-24, commercial production is high in cattle and buffaloes, but quite low in other productions. It was also observed in communities in Rangamati that people rear animals basically for self-consumption, or community level sale and exchange.

Livestock	Use of Livestock	Rangamati	National	Share
	Commercial	6,103	194,154	3.14%
Cattle & Buffaloes	Subsistance	137,927	24,941,184	0.55%
	Total	144,030	25,135,338	0.57%
	Commercial	11,226	881,507	1.27%
Goats & Sheep	Subsistance	125,458	16,577,554	0.76%
	Total	136,684	17,459,061	0.78%
	Commercial	34,290	21,809,649	0.16%
Fowls & Ducks	Subsistance	987,086	166,588,650	0.59%
	Total	1,021,376	188,398,299	0.54%
	Commercial	0	115,410	0.00%
Pigeons	Subsistance	16,230	10,764,513	0.15%
	Total	16,230	10,879,923	0.15%

 Table 4-24: Numbers and Ratio of Livestock Production in Rangamati

No.	Name of Project	Duration	Budget	Activities
1	a) Poverty alleviation through self employment (Phase-I)	Continuous	BDT 1,141,500	Providing Loan for livestock activities
1	b) Poverty alleviation through self employment (Phase-II)	Continuous	BDT 1,579,001	Training on cow rearing for self employment
2	a) Micro credit activities to alleviate poverty (Goat)	Continuous	BDT 3,300,000	Providing Loan for livestock activities
2	b) Micro credit program to alleviate poverty (Goat)	Continuous	BDT 510,001	Training on cow rearing for self employment
3	a) Breed up gradation through Progeny test Project (Phase-I)	Continuous	BDT 38,750	Providing Loan for livestock activities
5	b) Breed upgradation through Progeny test Project (Phase-II)	Continuous	BDT 74,749	Training on cow rearing for self employment
4	Anti-septic spray program for the Livestock, Poultry and Duck	Continuous	BDT 74,750	Training on spray
5	Training program at the Union level about Livestock, Poultry and Duck	Continuous	BDT 543,500	Training on Poultry
6	Artificial breeding extension and transplant technology of fetus implementation project (Phase-II)	Continuous	BDT 90,000	Training and Loan for livestock
7	Bird flu surveillance activities project	Continuous	-	Collect bird flue sample and test

Table 4-25: Summary of Projects in DoL

Source: Interview with Department of Livestock

As is described in Table 4-25, various projects are implemented by DoL. Main activities are training programs with loan for poverty reduction, introduction of new varieties, and livestock management.

Fishery

Fish production by water bodies is shown in Table 4-26.

		(unit: ton)
	Rangamati	National
River	N/A	138,016
Beel	29	79,200
Kaptai	8,590	8,590
Flood Land	N/A	879,513
Pond	N/A	912,178
Baor	N/A	5,038
Shrimp Farm	N/A	145,585
Total	8,619	2,168,120

Table 4-26: Fish Production by Water Bodies

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Annual fish catchment in Rangamati is not to be compared with catchment in Khagrachhari and Bandarban, though contribution to national catchment is only 0.4%. Fish catch of Kaptai in 2011 was about 9,000 tonnes, which values about 67,500,000TK. 5% of the value is paid as tax to the Bangladesh Fish Development Corporation (BFDC). Local consumption is about 1,000 tonnes, and the rest of them are sold in Chittagong. The Department of Fishery (DoF) implements a project titled "Fish Production Conservation and Management Project in Kaptai Lake" from 2011 to 2013. In this project, BFDC, Fish Research Institute, Rangamati Fishery Office conduct activities such as enforcement of fishery law (Fish Act), establishment of

training centers, promotion of fish nursery, and so on. Other projects implemented by the Rangamati Fishery Office are as mentioned in Table 4-27.

Office	Name	Duration	Budget	Activities
1	Poverty reduction program in fisheries sector by providing micro credit	Continuous	484,000	Providing loan for fishery
2	Poverty reduction program by integrated fisheries activities	Continuous	5,116,993	Providing loan for fishery
2	A wareness program on using formalin and			Conducting awareness program
3	controlled formalin	-	-	Conducting mobile court for fish protection.
				Conducting training to the fishermen
4	Identified water body development and management	-	-	Preservation of native species fish finger lings
				Cultivation of fish fingerlings in nursery
				Fish fingerlings breeding
Ē	Strengthening of production, preservation			Establishment of training center
5	and management of fisheries growth in Kaptai lake – component B	-	-	Conducting training
				Fish act implementation by mobile court

Table 4-27: Projects in Fishery Office in Rangamati

Source: Interview with Fishery Office

The Fishery Office promotes fish culture in creek in which water is stored by small dam in Rangamati. The Engineering Department in the Fishery Office supports the community to establish creek dam which costsabout 300,000 to 500,000TK. Then, the Fishery Office provides fish fries and training for fish cultivation for communities. 287 creek dams with 131.79 ha of water bodies have already been established. It is estimated that there are 4,727 potential creeks in Rangamati. It is said that there is high potential in creek dam development in the hill areas, but accessibility is among the crucial challenges for providing government services.

Forestry

Forest in Bangladesh is geographically categorized into nine units, and Forestry Offices in different districts implement projects according to the categories. Khagrachhari, Rangamati and some part of Bandarban are included in one circle. The rest of Bandarban forest belongs to the Chittagong circle. The Head of Circle is Conservator of Forest. There are six divisions controlled by Divisional Forest Officers who is under the Conservator of Forest. 59 Range Officers in total work in six divisions in Rangamati. The main responsibility of the Forestry Office is to manage protected forest and reserved forest. Field level activities are managed by the Range Office. Permission for logging should be given by the Forestry Office according to the CHT Forest Transit Rule in 1973. Un-classified Forests are supposed to be controlled by HDC, but it is still managed by the Deputy Commissioner Office.

There are some ongoing national projects implemented in CHT such as Agar Plantation Project (from 2010 to 2015) and Bamboo Cane Project. Social Forestry Program had started in 2008, but it was suspended. Challenge in forestry is the same as in Khagrachhari. Timber

production in Rangamati is 200,000 cubic feet (CFT) per month. Table 4-28 shows area of forest by types. As it is clear in Figures 4-15 and 4-16, the ratio of Protected Forest (20th Amendment) and Un-classified State Forest (USF) are the major forest types in Rangamati. The total forest area in Rangamati accounts for 21.73% of the total Bangladeshi forest.

			Share of
Production	Rangamati	National	Rangamati
Protected Forest (20th Ammendment)	573,265.2	3,020,047.9	18.98%
Protected Forest (4 & 6th Ammendment)	57,127.7	1,457,171.5	3.92%
Reserved Forest	0.0	91,381.9	0.00%
Acquired Forest	1.5	20,848.4	0.01%
Vested Forest	0.0	9,492.0	0.00%
Un-classfied Forest	0.0	42,847.5	0.00%
Total Forest Area Controled by Forestry Dept.	630,394.4	4,641,789.12	13.58%
Un-classfied State Forest	763,890.5	1,716,609.32	44.50%
Khas Forest Area	21.5	59,510.84	0.04%
Total Forest Area	1,394,306.4	6,417,909.3	21.73%

Table 4-28: Ratio of Forest by Type in Rangamati



Source: Yearbook of Agricultural Statistics of Bangladesh-2010





Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-16: Ratio of Forest by Type in Bangladesh

According to the hearing from members of the Timber Merchant Association, it started with about 50 members in 1991. Income of the association is membership fee of 50TK per month, and donation from timber merchants, which is 1,000TK per timbers of one truck. The association also provides services to members such as advice on forestry law, loan, and selection of recipients of sapling from the Forestry Office, and so on. Legal logging in Rangamati is about 250,000CFT per month. Timbers are wholesaled in Dhaka. The price of 1CFT is sold at 500TK by timber producers, and it is sold at 2,000TK by wholesaler in Dhaka. There is no specific project that the association is involved in. It purchased 100 acre of land from local headman, but they have not yet started activities due to lack of funds.

4.2.2 Cottage Industry

Textile weaving is very common in tribal society. It is practiced at the household level. It is said that some amount of traditional textile are sold in market especially to tourists, but it is very limited because producers do not have institutional or organizational establishment and marketing system. We describe challenges and opportunities for the cottage industry with findings collected from a women's group. According to the interview to a women's association named Pani Purbo Mohira Samity, they started their group activities based on micro-finance. Initially, it was a self-organized association. Because the NGO which had been supporting them by micro-finance received funds from UNDP to develop the cottage industry, the association was reorganized as a women's group for textile development. They received 50,000TK to start production of textile. The NGO provided training on business management. They have 50 members who are able to produce traditional textile, and 30 members received weaving materials, and regularly produce textile. Profit from one set of traditional textile is 500 to 4,500TK. Usually one person can produce 4 sets of textile per They said that it is necessary to produce textile with new design because what they month. can produce is only traditional dress which would not be used by the majority of Bangladeshi and tourists. They usually sell their product in cultural events held 1 or 2 times per year; otherwise they sell it through personal network. Thus, marketing is one of the essential challenges for the women's group.

Sericulture

A branch of Bangladesh Sericulture Research and Training Institute (BSRTI) is in Rangamati. Rangamati BSRTI is a sub-station of BSRTI in the Rajshahi district. The main objective of the institute is to develop and promote new sericulture technology. The project, titled "Project on Sericulture Research and Technology Dissemination in Hilly Area" started in 2009, and will end in 2012. In this project, they developed high yielding silk warm variety, which can produce about 5 time larger amount of silk than the norm. They also introduced a new variety of mulberry which can produce three times as large amount of feed for silk warm than normal mulberry. Silk production is based on household level, so BSRTI supplies 500 farmers with improved silk warm. They also buy cocoon from farmers, and wholesale to the Sericulture Board in Rajshahi. Total national supply of cocoon is only 30 to 80 tonnes; while the demand is 300 tonnes. The demand is supplemented by import from China and Vietnam so far. Since the quality of cocoon produced in Rangamati is better than import products, multiplication of production is among the challenges for sericulture development.

Paper Mill

According to the interview from a representative of Karnaphuli Paper Mill, the mill is under the Ministry of Industry, and one of the companies supervised by the Bangladesh Chemical Industry Corporation (BCIC). The Chairman of the Company is Additional Secretary deputed by central government. The total number of employees is 1,602 which consist of 182 officers, 562 staffs and 858 workers. They use pulp timber and bamboo for paper production. The

ratio of pulp tree and bamboo is 70% and 30% respectively. Production per day is 100 tonnes, and annual targeted production is 25,000 tonnes. Recently, the number of private companies is increasing. 50 to 60 companies exist at present, and paper supply does not meet the demand yet. Price of paper produce by private companies is about 80,000TK per ton, but Karnaphuli paper mill sells at 85,000TK per ton. They sell paper to government organization and educational institutions exclusively. One of the problems is shortage of pulp tree. The company has rented 1,000 acres of forest land for 99 years from the Forestry Office, but the land area was occupied by jhum cultivators. In order to secure raw material for paper production, they had tried to produce jute paper, but it is still not practical. They know about paper production with eichhornia crassipes, but had never thought of trial for paper production. Another challenge is the lack of skilled labor. Due to lack of funds, they are not able to recruit young workers and train them.

4.2.3 Particularity of Local Industries in Rangamati

Rangamati has several options for industrial development due to its geographic and economic position in CHT. The biggest lake in Bangladesh, for example, provides fish resources. As we have described above, sericulture is also one of the industries with opportunities. Since there is chance to acquire a share in the national market, multiplication of cocoon production is expected. The majority of producers are local farmers, thus, it is also expected to support income generation. Since most of the people actually depend on agricultural production in Rangamati, agriculture development should still be the footing of local industry. This area is not very good in producing rice, but strong in fruits production. Challenges in fruits production are marketing and improvement of production.

4.3 Bandarban

4.3.1 Agro-based Industries

Agriculture

Local industries in Bandarban are based on agriculture as the other two districts in CHT, but geographic characteristics such as high and steep mountains exaggerate the particularity of this area.

Tables 4-29, 4-30, 4-31 and 4-32 show cultivated areas of rice, other major crops, vegetable and fruits. As can be seen, rice cultivation in Bandarban is larger than other areas in CHT. Looking at the details of rice cultivation, boro cultivation is much less than that of aus and amon. It can be assumed that there is difficulty in securing water for rice cultivation especially during dry season in this area. It was also observed during field visits in the Bandarban community (see community profiles). Other major crop and vegetable cultivation are larger than rice cultivation. These products are cultivated especially on hill slopes. Taro cultivation in vegetable and cultivation area of jackfruit are outstanding in Bandarban.

National	Kagrachari	Aus		Aman		Boro	
Cultivated Area	Cultivated Area	Local	HYV	Local	HYV	Local	HYV
26,881,000	39,931	14,470	4,408	1,486	19,307	21	260

Table 4-29: Cultiv	ated Area for	Rice in	Bandarban
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National Cultivated Area	Bandarban Cultivated Area	Maiz	Til	Tarmaric	Ginger	Rabi Chili
711,792	5,280	343	1,182	1,703	1,334	718

Table 4-31: Cultivated Area of Vegetable in Bandarban

National Cultivated Area	Bandarban Cultivated Area	Lady's Finger	Jinga	Taro	Rabi Pumbkin	Tomato	Beans	Sweet Potato
308,512	2,810	210	409	949	291	298	280	373

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Table 4-32: Cultivated Area of Fruits in Bandarban

National Cultivated Area	Bandarban Cultivated Area	Banana	Pinapple	Mango	Papaya	Jackfruit	Wood Apple
2,364,530	14,589	3,201	1,493	2,300	1,694	5,705	196

Source: Yearbook of Agricultural Statistics of Bangladesh-2010



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-17: Ratio of Major Crops of Bandarban in National Cultivated Area



Figure 4-18: Ratio of Cultivated Area of Major Crops in Bandarban and Bangladesh

Table 4-33 shows that in all rice varieties, Bandarban maintains national level productivity. As is described in the community profile of Kattoripara in Bandarban, people produce HYV rice with irrigation facilities. On the other hand, in Langraipara, people could produce only jhum rice which is a local variety on hill slope. Because many parts of Bandarban are of hill slope, and people depend on the land, it should be assumed that limited number of people actually produce HYV rice on limited plain land in Bandarban.

District	Rice	Variety	Item	2008/09	2009/10	National (2009/10
			Area (acre)	14,395	14,470	832,230
		Local	Production (ton)	9,059	6,341	393,434
	A 110		Yield (ton/acre)	1.59	2.28	2.12
	Aus		Area (acre)	6,405	4,408	1,599,462
		HYV	Production (ton)	6,577	4,349	1,315,693
			Yield (ton/acre)	0.97	1.01	1.22
	Amon		Area (acre)	1,295	1,486	3,494,580
		Local	Production (ton)	1,248	1,099	2,236,737
Dondonhon			Yield (ton/acre)	1.04	1.35	1.56
Danuarban		HYV	Area (acre)	19,350	19,307	9,323,203
			Production (ton)	21,105	21,570	9,403,633
			Yield (ton/acre)	0.92	0.90	0.99
			Area (acre)	21	-	265,220
		Local	Production (ton)	30	-	214,550
	Poro		Yield (ton/acre)	0.70	-	1.24
	B010		Area (acre)	1,075	260	9,671,268
		HYV	Production (ton)	1,784	418	14,622,485
			Yield (ton/acre)	0.60	0.62	0.66

Table 4-33: Cultivated Area and Productivity of Rice in Bandarban

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

In terms of other major crops, there are some crops that are produced more than the national average as shown in Table 4-34. For example, productivities of til, turmeric and chili are higher than national standard; meanwhile, the production of maize is about half of the national level.

Name of Crops	Items	2008/09	2009/10	National (2009/10)
	Area (acre)	395	343	375,628
Maiz	Production (ton)	127	281	887,391
	Yield (ton/acre)	0.32	0.82	2.36
	Area (acre)	1,040	1,182	87,850
Til	Production (ton)	301	897	32,306
	Yield (ton/acre)	0.29	0.76	0.37
	Area (acre)	1,609	1,703	56,203
Turmaric	Production (ton)	3,998	4,173	117,081
	Yield (ton/acre)	2.48	2.45	2.08
	Area (acre)	1,207	1,334	22,403
Ginger	Production (ton)	3,194	3,585	74,841
	Yield (ton/acre)	2.65	2.69	3.34
Rabi Chili	Area (acre)	810	718	169,708
	Production (ton)	1,331	1,300	90,042
	Yield (ton/acre)	1.64	1.81	0.53

Table 4-34: Productivity of Other Major Crops in Bandarban



Source: Yearbook of Agricultural Statistics of Bangladesh-2010



As demonstrated in Table 4-35, productivities of vegetable are comparatively lower than national productivities. For example, taro and pumpkin are major crops cultivated in jhum, but the productivity is low in Bandarban. Lady's finger, tomato and beans are usually cultivated at home gardens mainly for self-consumption, but their productivities are also lower than national average. On the other hand, production of jinga³ is the same as the national standard, and productivity of sweet potato is higher.

³ Jinga is a local name of Ridge Gourd or Luffa.

Name of Vegetable	Items	2008/09	2009/10	National (2009/10)
	Area (acre)	203	210	25,204
Lady's Finger	Production (ton)	150	159	42,366
	Yield (ton/acre)	0.74	0.76	1.68
	Area (acre)	399	409	23,039
Jinga	Production (ton)	779	801	44,064
	Yield (ton/acre)	1.95	1.96	1.91
	Area (acre)	858	949	58,736
Taro	Production (ton)	1,724	1,808	224,546
	Yield (ton/acre)	2.01	1.91	3.82
	Area (acre)	316	291	24,908
Rabi Pumpkin	Production (ton)	798	784	124,534
	Yield (ton/acre)	2.53	2.69	5.00
	Area (acre)	310	298	58,854
Tomato	Production (ton)	810	794	190,213
	Yield (ton/acre)	2.61	2.66	3.23
	Area (acre)	266	280	40,992
Beans	Production (ton)	281	295	88,581
	Yield (ton/acre)	1.06	1.05	2.16
	Area (acre)	354	373	76,779
Sweet Potato	Production (ton)	1,723	1,748	306,633
	Yield (ton/acre)	4.87	4.69	3.99

Table 4-35: Productivities of Vegetable in Bandarban



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-20: Yield of Vegetable in Bandarban and Bangladesh

The ratio of cultivated area of fruit in Bandarban is larger than the national level, but lower in CHT. Productivities of banana and pineapple are slightly less than the national standard (see, Table 4-36). However, as it is shown in Table 4-37, mango, papaya and wood apple are higher than the national average in its yield per tree.

Name of Vegetable	Items	2008/09	2009/10	National (2009/10)
	Area (acre)	3,187	3,201	133,305
Banana	Production (ton)	18,701	17,846	818,254
	Yield (ton/acre)	5.87	5.58	6.14
	Area (acre)	1,436	1,493	39,583
Pinapple	Production (ton)	5,709	7,074	234,493
	Yield (ton/acre)	3.98	4.74	5.92

Table 4-36: Yields of Banana and Pineapple in Bandarban



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-21: Yields of Banana and Pineapple in Bandarban and Bangladesh

		Area Under Garden		Average Yield Per Fruit		
		(ac	re)	Bearing	Гree (kg)	
	Fruit	2008-09	2009-10	2008-09	2009-10	
Mango	Bandarban	649	378	84	96	
Mango	National	76,715	79,066	67	81	
Danava	Bandarban	113	95	29	32	
Papaya	National	2,750	2,790	23	20	
Icalefanit	Bandarban	582	283	227	244	
Jackiluit	National	22,814	25,166	138	135	
XX7	Bandarban	10	17	77	83	
wood Apple	National	220	177	52	51	

Table 4-37: Productivities of Fruits in Bandarban



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-22: Productivities of Fruits in Bandarban

No.	Name	Duration	Budget	Activities
1	Improved seed production,	5 years	315,000.01	210 demonstration (BRRI Dhan-
	storage & distribution project	(Extended)		28=130, BRRI Dhan-29=65, BRRI
	at farm level			Dhan-50=15)
2	Establishment of high	2010-2011	-	Conducted 29 demonstration program
	productive fruits garden			of fruits at 29 Union
3	Orange development	2010-2011	-	Distribution of orange plant to 732
				family (12plants / family)
				Demonstration of orange Block

Table 4-38: DAE Project in Bandarban

Source: Interview from DAE in Bandarban

Livestock

Table 4-39 shows that productions in any livestock in Bandarban are less than 1%. It was also observed in the field survey that animal productions were basically for self-consumption, and commercial oriented products were limited.

Livestock	Use of Livestock	Bandarban	National	Share
	Commercial	642	194,154	0.33%
Cattle & Buffaloes	Subsistance	112,368	24,941,184	0.45%
	Total	113,010	25,135,338	0.45%
	Commercial	4,863	881,507	0.55%
Goats & Sheep	Subsistance	52,856	16,577,554	0.32%
	Total	57,719	17,459,061	0.33%
Fowls & Ducks	Commercial	10,859	21,809,649	0.05%
	Subsistance	549,005	166,588,650	0.33%
	Total	559,864	188,398,299	0.30%
	Commercial	472	115,410	0.41%
Pigeons	Subsistance	14,517	10,764,513	0.13%
	Total	14,989	10,879,923	0.14%

Table 4-39: Productivity of Livestock in Bandarban

Fishery

In the field survey, we could not observe even small scale fishery in ponds and rivers. It is assumed that the situation of fishery in Bandarban is more or less the same in other areas. Table 4-40 shows fish catch in different types of water bodies. As can be seen, fish catch is comparatively higher in flood plain, but the amount of fish catch is still limited.

	Bandarban	National
River	17	138,016
Beel	N/A	79,200
Flood Land	154	879,513
Pond	N/A	912,178
Baor	N/A	5,038
Shrimp Farm	N/A	145,585
Total	171	2,159,530

Table 4-40: Fish Catch by Water Bodies in Bandarban

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Forestry

As demonstrated in Table 4-41, the share of forest area of Bandarban is 17% of total forest land. There is no reserved forest, but the area of UCF is very high, accounting for 90% of total UCF in Bangladesh, and 62% of forest land in Bandarban. Un-classified State Forest is 29%. According to the hearing from local people, due to the increase of population, especially by migration from out of CHT, local people have lack of land for jhum cultivation these days. UCF is also occupied by settlers and logged by outsiders.

Table 4-41	: Area of	Forest	by	Types
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Production	Bandarban	National	Share of Bandarban
Protected Forest			
(20th Ammendment)	242693.4	3020047.88	8.04%
Protected Forest			
(4 & 6th Ammendment)	23535.4	1457171.47	1.62%
Decomined Format	0	01291.90	0.00%
Reserved Folest	0	91361.69	0.00%
Acquired Forest	0	20848.4	0.00%
Vested Forest	0	9491.97	0.00%
Un-classfied Forest	38644.75	42847.51	90.19%
Total Forest Area Controled by			
Forestry Dept.	304873.55	4,641,789.12	6.57%
Un-classfied State Forest	494372.5	1,716,609.32	28.80%
Khas Forest Area	0	59,510.84	0.00%
Total Forest Area	799246.05	4641789.12	17.22%



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-23: Ratio of Forest by Types in Bandarban



Figure 4-24: Ratio of Forest by Types in Bangladesh

4.3.2 Tourism Industry

There was no statistical data on tourism in Bandarban like the other two districts. Thus, we obtained an interview from one tourism company in Bandarban. The company organizes tours to various places in Bangladesh such as Sylhet, Barisal, Rajshahi and CHT. They have only one own resort hotel in Bangladesh, which is located on a mountain near by Bandarban town. They said that the number of tourists is dramatically increasing in CHT, especially in Bandarban. During the tourism season from October to April, all hotel rooms are always occupied, though number of guests is half of it the rest of the time. 80% of guests in this hotel are foreigners, because the price of this hotel is higher than the standard hotel in Bangladesh (more than 3,000TK per night). They provide tour packages for guests such as riverside tracking, highland tour, and tour to tribal villages. While tourism industry is booming in Bandarban, establishment of services and infrastructure are not catching up with the increase of tourists. Waste management, water supply and road construction will be the main issues for infrastructure. Since people visit CHT to enjoy cultural practice of local people which is based on nature, conservation of the environment is also an urgent issue to be tackled.

4.3.3 Particularity of Local Industries in Bandarban

Similarly with Khagrachhari and Rangamati, agriculture is the basic sector for industrial development in Bandarban. Due to the geographical limitation, it may be difficult to increase production of rice in Bandarban, unless further improvement of HYV proceeds. Potential crops for income generation are turmeric, chili and ginger. Jackfruit, mango and papaya are also potential products to be developed as the footing of local industries. Where they can improve in terms of industrial development are scale of production, transportation and post-harvesting treatment. Tourism industry has high potential since the number of tourists increase year by year. In order to establish the tourism industry in Bandarban, they need to meet the demand of tourists such as basic infrastructure, public and private services for visitors and conservation of cultural and natural diversity.

4.4 Cox's Bazar

4.4.1 Agro-based Industries

Agriculuture

The economy of CXB is quite different from the situation in CHT. Industries in CHT are based on natural resources in especially on hill slope such as vegetables, fruits, fish culture in creek dam, sericulture and paper mill. On the other hand, basic resources for industries in CXB are not only hill, but also the sea. According to "Statistical Yearbook of Bangladesh-2010" and "Yearbook of Agricultural Statistics of Bangladesh-2010," there are few data on agriculture in CXB. Thus, we will describe the agricultural situation qualitatively below. Since CXB has large plain land compared to CHT, rice cultivation is the basic production in agriculture like other parts of Bangladesh. As it is shown in Table 4-42, HYV of amom and boro are the same as the national average in productivity. It was also observed in field survey in the communities of CXB.

District	Rice	Variety	Item	2008/09	2009/10	National (2009/10
			Area (acre)	25	26	832,230
		Local	Production (ton)	14	15	393,434
	A use		Yield (ton/acre)	1.79	1.73	2.12
	Aus		Area (acre)	1,760	1,606	1,599,462
		HYV	Production (ton)	1,857	2,194	1,315,693
			Yield (ton/acre)	0.95	0.73	1.22
			Area (acre)	7,170	7,564	3,494,580
	Amon	Local	Production (ton)	5,658	7,827	2,236,737
Khagraahari			Yield (ton/acre)	1.27	0.97	1.56
Kilagiacilali		HYV	Area (acre)	169,340	173,588	9,323,203
			Production (ton)	206,760	216,872	9,403,633
			Yield (ton/acre)	0.82	0.80	0.99
			Area (acre)	0	0	265,220
		Local	Production (ton)	0	0	214,550
	Boro		Yield (ton/acre)	0.00	0.00	1.24
	DOIO		Area (acre)	12,777	10,305	9,671,268
		HYV	Production (ton)	17,165	16,456	14,622,485
			Yield (ton/acre)	0.74	0.63	0.66

Table 4-42: Productivity and Cultivated Area of Rice in CXB



Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Figure 4-25: Ratio of Irrigated Area by Facility

Other major crops such as turmeric and ginger are not observed in the field survey. Production of vegetable was also limited, though they sell surplus in market for income. Main cash crops in CXB were betel leaf and betel nut. As is described in community profiles in CXB, betel leaf generates high profit, but it costs people to produce betel leaf because it requires high inputs such as fertilizer, pesticides and shed. At the same time, betel leaf is easily affected by insect disease, and destroyed all at once. Thus, it is said that betel leaf cultivation is high risk and high return. Betel leaf and betel nut are widely produced in CXB, thus production and marketing system were already established though there should be need of improvements. Apart from betel leaf and nut, watermelon is an important cash crop in CXB. Farmers produce watermelon during the dry season which is off-season for rice cultivation. Producers sell them to middleman, and they are wholesaled in CXB town. It is said that if they have better irrigation facilities, they could produce larger watermelon, besides expanding area of cultivation.

Livestock

As is livestock in CHT, livestock production in CXB is low in general. Table 4-43 shows that production of goat, sheep, and poultry are all less than 1%, but only commercial purpose production of cattle and buffaloes is over 1% contribution. This was also observed in the field survey. People hardly keep large animals but only for plowing purpose. Though they do poultry, it is basically for own consumption, and small sale according to the need of cash.

Livestock	Use of Livestock	Cox's Bazar	National	Share
	Commercial	2,241	194,154	1.15%
Cattle & Buffaloes	Subsistance	187,231	24,941,184	0.75%
	Total	189,472	25,135,338	0.75%
	Commercial	12,587	881,507	1.43%
Goats & Sheep	Subsistance	142,085	16,577,554	0.86%
	Total	154,672	17,459,061	0.89%
	Commercial	147,003	21,809,649	0.67%
Fowls & Ducks	Subsistance	1,176,011	166,588,650	0.71%
	Total	1,323,014	188,398,299	0.70%
	Commercial	815	115,410	0.71%
Pigeons	Subsistance	27,245	10,764,513	0.25%
	Total	28,060	10,879,923	0.26%

Table 4-43: Numbers of Livestock and Share in National Production in CXB

Table 4-44 shows projects implemented by the Department of Livestock in CXB. The projects are to vaccine for poultry, loan for goat rearing and so on.

No.	Name of Project	Duration	Budget	Activities
1	Poultry and cow vaccination	on going	4,900,000	Average 60% recovered
2	Small scale loan for Goat rearing	on going	2,360,000	
3	Free interest and funding on Duck, poultry and	on going	1,440,000	
	goat rearing			

Table 4-44: Projects of Department of Livestock in CXB

Source: Interview from officers in Department of Livestock

Fishery

CXB has one of the best access to sea resources in Bangladesh, thus fishery is one of the important industries. On the other hand, as can be seen in Table 4-45, productions of inland fishery are not very high. According to the hearing from the Department of Fishery in CXB, the main fish products are row fish, dry fish and shrimp fry. Row and dry fishes are collected from coast, and wholesaled in Dhaka and Chittagong. Some amount of frozen and dry fish is exported. CXB is famous for shrimp hatchery. Shrimp fries hatched in CXB are sold to shrimp culture farmers in Khulna division. It is said that the environment in CXB is favorable for shrimp hatchery, but not for culture. However, by improving technologies of shrimp culture, they have the opportunity to develop shrimp culture in CXB. At present, shrimp production in Khulna is 1 ton per hector, while they produce only 150 to 200kg per ha in CXB. Fishing practice in CXB is based on household level. Fishermen use small engine boat which can accommodate only 5-6 persons. Catch of fishes is not stable. They usually sell row fishes to middlemen who visit villages. According to an interview in the community, it is said that the catch of fish is decreasing year by year. It is also demonstrated by the Department of Environment which implemented an environmental conservation project in CXB that there are endangered fish species in CXB.

									(ton)
District	River	Sundarban	Beel	Kaptai Lake	Flood Inland	Pond	Baor	Shrimp Farm	Total
Cox's Bazar	717	-	-	-	5,293	21,024	-	3	27,037
Chittagon Division	42,989	-	558	8,590	198,309	243,616	-	31,087	525,149
National	138,160	18,462	79,200	8,590	879,513	912,178	5,038	145,585	2,186,726

Table 4-45: Fish Catch by Water Bodies in CXB

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Table 4-46: Catch Ratio of Inland and Marine Fisheric

Contain of Fight order		Total Catch	
Sector of Fisheries	Water Area (Ha)	(ton)	%
Inland Fisheries	4,575,706	2,186,726	80.95
Marine Fisheries	-	514,644	19.05
Total	4,575,706	2,701,370	100

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

The Fishery Office provides technical training for people on fish and shrimp culture, because they use traditional method for fish and shrimp culture. They also give training on fishery law, and monitoring on law enforcement. In order to prevent illegal fishing, they promote fishing license to fishermen. There is illegal practice of shrimp fry collection in the coastal area, which is usually practiced by poor people including Rohingya. They sell shrimp fry to

middlemen and they sell them in Khulna. In order to stop this illegal practice, they do monitoring of fishing practice. Quality control is another important activity of the Fishery Office. They visit fish farm and market, and check hygiene and use of medicine. In order to improve shrimp culture technology, 7,021 acre of land is leased for the Fishery Office, but due to the lack of funds, they have not yet utilized it. Officers in the Fishery Office are shown in Table 4-47.

Name of Designation	No. of Post	Vacancy	
District Fishery Officer	1		
Assistant Director	1	1	
Quality Control Inspector	1		
Sub-assistant Engineer	1		
Fishery Survey Officer	1	1	
Head Assistant	1	1	
Accountant	1	1	
Office Assistant	1		
MLSS	3	2	
Driver	1		
Total	12	6	
Source: Hearing from officers in Fishery Office			

Table 4-47: Officers in Fishery Office

Source: Hearing from officers in Fishery Office

SI.				
No.	Project's Name	Duration	Budget	Activities
1	National Agricultural	2008-	2011-12=45,760	1. Group Formation
	Technology Project	2013	2010-11=103,049	2. Training for Selected groups
	(NATP)		2009-10=163,885	3. Demonstration Pond establishment
				4. Exchange Visit
				5. Technology Fair
				6. Establishment of Farmers information center
				(FIAC) at union parisad office
				7. Recruit Local Extension Agent for Fisheries
				(LEAF)
2	Bagda Shrimp Culture	2007-	2011-12=26,000	1. Farmer's Training
	Technology Extension	2012	2010-11=195,000	2. Demonstration Farm establishment
	Project		2009-10=80,000	3. Exchange Visit
				4. Professinal Training on Bagda Shrimp
				Hatchery Operation (Nation wide)
3	Union Level Fish Culture	2009-	2010-11=90,000	1. Training for Selected farmers
	Technology Service	2014	2009-10=15,000	2. Demonstration Pond establishment
	Extension Project			3. Recruit Local Extension Agent for Fisheries
				(LEAF)
4	Strengthening of Fishery	2010-	2011 - 12 =	1. Training & Motivation special emphasis on
	and Aquaculture Food		136,000/=	Shrimp Hatchery, Farm, Depot & Fish Processors
	Safety and Quality			personnel and all other stakeholders
	Management Systen in		2010 - 11 =	2. Up gradation of Fish & Fish Products
	Bangladesh (BEST project)		63,000/=	Exporters establishment.
5	Marine Fisheries Capacity		2010-11=10,000/=	1. Survey of fishing crafts & gears
	Building Project		2009-10=19,000/=	2. Data collection of Marine Fisheries Resources
			2008-09=42,000/=	
6	Selected Degradated Water		Nil	1. Indigenous small fish fry release in natural
	bodies development &			water bodies
	management and			2. Degradated water bodies develop for fish
	conservation of Indigenous			culture
	small fishes			

Table 4-48: Projects in Fishery Office

Source: Interview with Fishery Office

Forestry

As Table 4-49 demonstrates, the area of reserved forest is remarkable in CXB, accounting for 37% of total reserved forest in Bangladesh. On the other hand, 60 to 70% of forest in CXB have degraded over the last 50 years.

UUX S DAZAF	National	Cox's Bazar
168,900.50	3,020,047.88	5.59%
30,000.00	1,457,171.47	2.06%
33,521.42	91,381.89	36.68%
0.00	20,848.40	0.00%
0.00	9,491.97	0.00%
0.00	42,847.51	0.00%
232,421.92	4,641,789.12	5.01%
0.00	1,716,609.32	0.00%
0.00	59,510.84	0.00%
232,421.92	4,641,789.12	5.01%
	Cox's Bazar 168,900.50 30,000.00 33,521.42 0.00 0.00 232,421.92 0.00 232,421.92	Cox's Bazar National 168,900.50 3,020,047.88 30,000.00 1,457,171.47 33,521.42 91,381.89 0.00 20,848.40 0.00 9,491.97 0.00 42,847.51 232,421.92 4,641,789.12 0.00 59,510.84 232,421.92 4,641,789.12

Table 4-49: Ratio of Forest by Type in CXB

Source: Yearbook of Agricultural Statistics of Bangladesh-2010

Participatory Forest has been implemented according to the Forest Act all over Bangladesh. It has started in CXB in 2002. In this forestry system, the people and government share 45% profit each and 10% will be deposited for Tree Farming Fund to invest on the next plantation. In this forestry system, around 20 to 30 households are grouped, and given 5 acre of land and saplings. They are supposed to cut branches of tree after four years, and make forest thin out in the 7th year, and cut all to make timber 10 years after the plantation.

Name of Designation	No. of Post	Vacancy
Divisional Forest Officer	1	-
Assistant Conservator of Forest	4	-
Range Officer	11	-
Forester	-	-
Forest Guard	5-7	-
Total	300	127

Table 4-50: Offices of Divisional Forest Office

Source: Hearing from officers in Divisional Forest Office

4.4.2 Tourism Industry

Tourism has been the center of attention as a key local industry in CXB for a long time. Moreover, the number of tourists is dramatically increasing year by year. The number of tourists was estimated at 15,000 persons per day from October to March in five years before, and now it is 20,000 persons. In order to meet this change, the master plan for tourism development was produced by related ministries and the local government. They proposed to establish an exclusive tourism zone, infrastructure, cricket stadium, a golf field, and an industrial port. Beach Management Committee is organized by the District Commissioner, Mayor of CXB city, Police, LGDE and other related local government departments. Challenges for the tourism industry are to set up basic infrastructure to meet demand of tourists and public services such as waste management and water and electricity supply. Because

many people come to CXB to see nature in coastal zones such as beach and mountains, it is proposed to promote environmental conservation and establishment of eco-tourism. CXB already has three eco-tourism centers, but they are not well managed. There is a sanctuary for Asian elephant in Teknaf.

4.4.3 Particularity of Local Industries in CXB

In CXB, rice is basically produced like other parts of Bangladesh, but betel leaf and nut are important as cash crops. Although they produce vegetables and fruits, these products are mainly for self-consumption, or sale in the local market. Only watermelon is produced as a market oriented item in this area. Fishery in the coastal area also has economic potential. Since it is demonstrated that the amount of fish catch has been decreasing year by year, it is recommended to promote sustainable use of coastal resource in fishing communities. Tourism is a promising industry for CXB, but there are many challenges to receive dramatically increasing tourists. Establishment of basic infrastructure with strategies to harmonize environmental conservation implemented by the Department of Environment is recommended for development of the tourism industry.

4.5 Characteristics and Challenges of Local Industries in CHT and CXB

4.5.1 CHT

As we have discussed throughout this chapter, agriculture is the foundation of local industries in CHT. Utilizing hill slopes, people produce varieties of crops such as turmeric, ginger, taro, sweet potato, pumpkin, jackfruit, mango, and banana. Many of vegetables are basically for self-consumption or limited sale in the local market, while some of crops such as turmeric, ginger, banana, papaya and other fruit have already been widely marketed. Some of the issues which are bottleneck for the development of an agro-based industry may be resolved through assistance. One of the challenges is soil erosion. It is caused by monoculture on hill slope. In order to optimize agricultural work and expand scale of production, people plant single cash crop on hill slope such as banana, pineapple, turmeric and ginger. It is said that the monoculture, especially of root vegetables, cause soil erosion. Bangladesh Agriculture Research Institute (BARI) and Bangladesh Conservation Approaches and Technologies (BANCAT) are inventing new cropping system to sustain hill environment and livelihood of jhum cultivators. Though these systems are not practically assessed on farm, alternative farming practice should be introduced for sustainable development of hill slope agriculture. Watershed management is also an essential issue for the development of local industries in CHT. It could multiply productions and cultivated areas by supplying water during dry season. Since creek dam has already been introduced in Rangamati, this method may be a possible way to supply water for agriculture on hill slope. Marketing is the third challenge for development of agro-based industries. It is assumed that lack of basic infrastructures such as storage facility, road communication and telecommunication are obstacles to sell agricultural products at competitive prices. Although a long term plan will be required for infrastructures, institutional approach such as organizing cooperatives could be taken to improve the marketing environment. Sericulture also has potential to be developed. High yielding varieties have already been invented; therefore, they need to disseminate the varieties to farmers. Since cocoon production is based on household level, it can also help the local community to generate income. Tourism industry is rapidly growing in CHT, but there is no specific plan to develop this sector in CHT as a whole. Since the challenges for tourism industries have already been clear, assistance for planning may be required in the future.

4.5.2 CXB

One of the basic industries in CXB will be fishery based. It has favorable environment for fishery such as seacoast fishery, fish culture, shrimp fry hatchery and fry fish production. By improving technologies for fishery, it can generate more productions and job opportunities. At the same time, they are expected to take some measures to promote sustainable development. Since fish catch has already decreased year by year, conservation of natural resource will be an urgent challenge requiring assistance. In the tourism sector, it can be proposed to make a detail plan to prevent destructive resource use and development. Some of areas of CXB have already been declared as Ecologically Critical Area⁴, and the Department of Environment has implemented a project to establish management of biodiversity in the coastal zone. However, due to lack of a holistic plan, it has not been able to regulate of the coastal area along with its development. Since some government forces have already developed plans for developing tourism in CXB, what they may need an integrative plan to develop the local industry.

⁴ Ecologically Critical Area is the area to conserve the evvirontment according to Bangladesh Environment Conservation Act in 1995.

5. Safe Drinking Water Profile

5.1 Basic Information for Water Supply

5.1.1 Geology and Geography

(1) Geology and Geography

According to the "Chittagong Hill Tracts Regional Development Plan, ADB (2000)" it is described that the CHT hills are the result of the uplifting, folding and faulting of sedimentary rocks dating from the Tertiary period. The folds run from the North to South, forming several semi-parallel anticlinal ridges in the east–west direction. The ridges consist of 'high hill' and 'low hill' ranges, formed by geological erosion of the original folds, which has exposed the oldest Miocene rocks of the inner core.

The elevation of the hill ranges increases towards the south–east from Rangamati and reaches a peak at few km south-east of Bandarban where peak elevation of the crest is approximately 1,300 m. The relief in this part is relatively young and V-shaped. Elevation of the hill range decreases towards the south, west and north from the highest peak.

Steepness of the slopes depends on the spacing between successive ridges and on the nature of the rock. Spacing decreases and slope steepness increases from west to east. The soils derived from these old rocks (Surma–Tipam soil series) occupy the core position of each anticlinal ridge while the lower hillocks (Dupi–Tila soil series) occur on the flanks. The slopes on the high hills are steep (slope classes C and D) in most cases. Those on the low hills become less steep away from the centre of the ridges (slope classes B and C).

The narrowly spaced ridges with steep slopes occupy a relatively small area on the north-eastern side of the CHT, of which they form a large part of the southern half (Bandarban). On a micro scale, steepness of slope is also affected by the occurrence of hard sandstone embedded in the predominant softer shales.

(2) Surface Soil

According to the "Chittagong Hill Tracts Regional Development Plan, ADB (2000)" it is described that soils of the high hills exceeding 100 meters of elevation are steeply sloping, excessively drained, and of shallow depth (usually less than 1 meter). They are yellowish brown to strong brown, well-structured, loamy, consisting of acid subsoils resting on consolidated or semi-consolidated siltstone, clayey siltstone or shale. Soils developed on shale are clay loam or silty clay loam, brownish yellow while those derived from sandstone are strong brown, sandy loam to sandy clay loam.

Well drained, dissected, sloping piedmont terraces may occur locally at the outer most part of the anticlines. Morphologically these terraces resemble the low hills. Like soils of the Dupi-Tila series, the piedmont terrace fan soils have deep, strong brown to yellowish brown, loamy, acid subsoil. The terrace fan soils are more strongly leached than Dupi-Tila soils and have a lower base saturation percent (less than 35%). The soils in the valleys are poorly to very poorly drained and have grey mottled, loamy to clayey, weakly structured, acid subsoil.

Irrespective of the parent material and lithology, hill soils occurring on the excessively drained narrow ridge crests, steep slopes and cliffs have a Cambic horizon, while those occurring on well-drained flat hill tops and gentle slopes have an Argillic horizon. The topsoil is usually dark grayish brown unless eroded

Parent Material	Location	Soil series	% of CHT
Hill Soils			
Consolidated shales, sandstones and siltstone	Higher hill ranges	Sandy loan, silty clay loam	70
(Surma-Tipam)			
Unconsolidated sandstone & siltstone	Lower hill ranges	Sandy or silty loam Sandy clay loan	26
(Dupi-Tila sands and			
clays)			
Alluvial soils			
Slope run-off	High river banks terraces	Silt loam layered with	4
Stream-borne sediment	Valley bottoms	sandy loam	
	floodplains	Silty clay loan layered with clay	

Table 5-1: Soil Distribution in CHT

Source: Chittagong Hill Tracts Regional Development Plan (ADB,2000)


Source: Geological Map of Bangladesh (Geological Survey of Bangladesh, 1990)

Figure 5-1: Geological Map



Figure 5-2: River Map

(3) River

According to the "Chittagong Hill Tracts Study on Potential for Integrated Water Resources Management, ADB (2010)" it is described that the rivers in the area flow along a north-south axis in either direction – depending upon the valleys involved. Northern catchments are drained by the Karnafuli River and its tributaries (Chengri, Myani and Kasalong) – while in the south the Sangu River is the main drainage. These rivers have cut deep gorges in a south-western direction before entering the coastal plain and draining into the Gulf of Bengal. In the Chittagong coastal plain, these rivers and their tributaries meander as a result of reduced flow velocity and routinely deposit large quantities of silt. Typical drainage patterns on hill slopes consist of a dense dendritic network of gullies fanning out into winding valleys.

5.1.2 Potential for Groundwater and Surface Water Development

(1) Groundwater

According to the "Chittagong Hill Tracts Study on Potential for Integrated Water Resources Management, ADB (2010)" it is described that CHT does not have an abundance of groundwater resources. This is mainly due to the great depth of consolidated shale bed that does not permit a high volume of annual recharge. However, along the synclinal region (valley areas) deep ground water is available within 100–300 m depth.

Almost everywhere in CHT, slope is very steep. In all cases, groundwater level reaches or comes close to the ground surface in monsoon and goes down to a depth of 1.5 m to 4.0 m below the surface in dry months indicating low groundwater fluctuation. The area is however considered unfavorable for extensive groundwater development. The aquifer has low transmissivities and intensive development would therefore incur large draw down. However, wells can be developed successfully on an individual basis.

According to the "Water Management Program Mission Chittagong Hill Tracts Bangladesh, (EU, 2012)", drinking water sources differ per area. In Khagrachhari tubewells and ring wells are quite feasible and common. In Rangamati lakeside communities use lake water and ring wells, while communities higher up use streams. In hilly Bandarban wells are rarely feasible and communities depend on streams mostly. Coverage of safe drinking water provision is expanding, but at the same time many streams are reported to dry up due to over-use and deforestation. Drinking water supply is affected by irrigation, industry and aquaculture.

(2) Spring

The spring is one of essential drinking water source for high hill area people.

According to Water Aid report, it is assumed that a hundred years ago, as many as 200,000 springs were flowing over the CHT area. It is unknown how many of these precious sources of fresh water exist today. In the context of geology, the springs located in Tipam Sandstone Formation seems most favorable geological formation in the context of flow of the springs. Bhuban and Bokabil Formations seem next to Tipam Sandstone and they can be designated as moderately suitable. Undifferentiated Dihing-DupiTila seems do not suitable for spring flow. (Assessment of the underlying causes for the deterioration of water flow in the natural springs of Chittagong Hill Tracts Districts (Water Aid))

(3) Kaptai Lake

The resulting Kaptai Lake covers an area varying from 55,000 to 68,000 hectares. The Kasalong and Myani Rivers both drain into the lake. Kaptai Lake is intensively used for transport and for domestic and commercial fishing. Lake waters are allowed to rise from June

to November – where after water levels drop as it is used for power generation. (Chittagong Hill Tracts Region Development (ADB).

According to interview from Kaptai Authority that water level of Kaptai Lake is controlled between 68 feet to 109feet MSL. At the moment bottom of lake is sediment upon 40 to 50 feet MSL by soil.

5.1.3 Water Supply

(1) Population and Proportion of Population Using an Improved Drinking Water Source

According to "Key Findings of the Bangladesh Multiple Indicator Cluster Survey 2009 (hereinafter referred to as MICS)" which was conducted by UNICEF, 69.7% of population in Khagrachhari, 66.5% in Rangamati, 67.8% in Bandarban and 96.6% in Cox's Bazar is using an improved drinking water source (Figure 5-3 and Tables 5-3). However "CHT Baseline Census Report (hereinafter referred to as BCR)" which field survey was conducted by Green Hill (NG) and published by Water Aid mentioned that 76% of population in Khagrachhari, 47% in Rangamati and 48% in Bandarban is using an improved drinking water source.

According to interview of Green Hill, most of population living in hill top area is not able to reach improved drinking water source. Main reasons are that road communication is not good and resident area is located above water source.



Population Without SW Access in each Upazila (MICS Data) % of Population Without SW Access MICS Data Source: Key Findings of the Bangladesh Multiple Indicator Cluster Survey 2009 (UNICEF)



		BCR ^{**1}		MICS ^{**2}			
District	Improved sources	Unimproved sources	Surveyed Number	Improved sources	Unimproved sources	Surveyed House Hold	
Khagrachhari	76%	24%	95,995	69.7%	30.3%	21,896	
Rangamati	47%	53%	90,895	66.5%	33.5%	26,884	
Bandarban	48%	52%	47,845	67.8%	32.2%	19,913	
Cox's Bazar	-	-	-	96.6%	3.4%	26,404	
Total	59%	41%	234,735	-	-	95,097	

Table 5-2: Population Ratio with No Access Improved Safe Water

Source: %1 CHT Baseline Census Report (2010, Water Aid), %2 Key Findings of the Bangladesh Multiple Indicator Cluster Survey 2009 (UNICEF)

5.1.4 Water Supply Technology

(1) Available Water Supply Device

In the CHT area, available water supply technologies are Deep tube-well (DTW), Shallow tubewell (STW), Ring well (RW), Dug well/Pat well which water source is groundwater and Gravity flow System (GFS), Infiltration Glary (IFG), Infiltration Well (IFW), Spring water, River Water, Lake water, Fall water which water source is surface water. Though, rain water harvest system is another technology.

According to interview form SAE of DPHE, Khagrachhari, Rangamati and Bandarban, well depth range of respective water supply device is shown in Table 5-2. Table 5-4 shows feature of respected water supply technology.

District	STW		DI	W	Ring Well		
District	Min	Max	Min	Max	Min	Max	
Khagrachhari	9	60	182	243			
Rangamati	30	106	39	188	7	22	
Bandarban	18	67	79	173	12	22	
Cox's Bazar	9	60	182	243	6	13	

Table 5-3: Installed Well Depth Range by Water Supply Device by District (m)

Source: Interview with DPHE

Water Supply Technology	Water Source	Advantages and Disadvantages
Deep tube-well	Groundwater	Large amount of water is available Need appropriate aquifer and drilling machine
Shallow tube-well	Groundwater	Popular in Bangladesh, Cheep, Machine is not require Hard rock area is not feasible
Ring well Dug well/Pat well	Groundwater	Machine is not require Suitable aquifer area is small, Need feasibility survey
Tara dev	Groundwater	Available pump up even groundwater level is Bellow 7m Difficult regular maintenance and to get spare parts
Spring	Groundwater	Common water source, Pump is not necessary Water source is far from hill top. Dried up during dry season
GFS	Surface Water	Collected water is supplied by gravity flow Dried up during dry season
Infiltration Glary	Surface Water	Collected water is supplied by gravity flow Regular maintenance for sand filter is require
Infiltration Well	Surface Water	Regular maintenance for sand filter is require
		Specific facility is not necessary
River Water	Surface Water	Water source is far from hill top. Dried up during dry season
		Dried up during dry season
Lake water	Surface Water	Water volume is huge
		Water level fluctuate between dry season and rainy season
Fall water	Surface Water	Divid up during drugger
		Dieu up uuning ury season Water strage tank is set un beside bouse
Rain water harvesting	Rain water	8- month drinking water volume should be reserved during rain season

Table 5-4: Water Supply	y Technology and	Feature
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Source: Prepared by the study team

(2) Source of Installed Water Supply Device

Table 5-5 shows percentage of water source of installed water supply devices. Most of water supply devices are using groundwater. That percentage is 99.9% in Khagrachhari, 99.9% in Cox's Bazar, 97.9% Rangamati and 94.5% in Bandarban. However, surface water is only5.6% is used in Bandarban and 1.9% in Rangamati (BCR).

Water Source	Khagrachhari ^{%1}	Rangamati ^{%1}	Bandarban ^{%1}	Cox's Bazar ^{**2}
Pipe line	0.01%	0.2%	0.9%	0.04%
Groundwater	99.9%	97.9%	94.5%	99.7%
Sueface Waer	0.1%	1.9%	5.6%	0.2%
Rain water	0.01%	0.1%	0.0%	0.04%

Table 5-5: Type of Installed Water Supply Device in Percentenge

Source: %1 CHT Baseline Census Report (2010, Water Aid), %2 Groundwater circle, DPHE provided information

0.1%

0.0%

0.0%

0.01%

5.1.5 Type of Water Supply Device

Other

According to MICS, 84% of population in Khagrachhari 76% in Cox's Bazar, 72% in Rangamati and 52% in Bandarban is using groundwater with improved and unimproved water device. However "Socio-Economic Baseline Survey of Chittagong Hill Tracts (hereinafter referred to as SBC)" mentioned that 63.0% of Bangalee in habitants of CHT are able to access

to improved groundwater source against 44.6% of Indigenous. Situation of surface water, percentage of unimproved water source is higher improved water source.

Water Source		Khagrachhari ^{%1}	Rangamati ^{%1}	Bandarban ^{%1}	Cox's Bazar ^{%1}	Indigenous peoples ^{**2}	Bangalee ^{**2}	All CHT ^{**2}
Pipe line	Improved sources	1.60%	5.90%	9.90%	20.60%	-	-	-
	Improved sources	67.0%	55.9%	48.2%	75.5%	44.6%	63.0%	53.0%
Groundwater	Unimproved sources	17.2%	16.1%	3.8%	0.5%	24.0%	8.0%	16.9%
	Sub total	84.2%	72.0%	52.0%	76.0%	68.6%	71.0%	69.9%
	Improved sources	1.1%	4.6%	9.6%	0.3%	5.5%	5.7%	5.5%
Sueface Waer	Unimproved sources	10.9%	17.3%	27.2%	1.5%	30.4%	28.5%	29.4%
	Sub total	12.0%	21.9%	36.8%	1.8%	35.9%	34.2%	34.9%
Rain water	Improved sources	0.10%	0.00%	0.10%	0.00%	3.30%	1.50%	2.50%
	Improved sources	0.00%	0.10%	0.10%	0.00%	-	-	-
Other	Unimproved sources	2.20%	0.20%	1.10%	1.50%	-	-	-
	Sub total	2.2%	0.3%	1.2%	1.5%	-	-	-
Num	ber of HH	21,896	26,884	19,913	26,404	1,786	1,452	3,238

 Table 5-6: HHs Acces to Imploved Water Supply Device in Percentage

Source: %1: Key Findings of the Bangladesh Multiple Indicator Cluster Survey 2009 (UNICEF), %2: Socio Economic Baseline Survey of Chittagong Hill Tracts 2009 (UNDP)

5.1.6 Time Spent for Water Collection and Distance of Water Source

Table 5-7 shows time spent for water collection that most of the households spend less than 15 minutes to collect both drinking- and cooking- water (82.78%), followed by a time range of 16–30 minutes (14.96% households). The highest proportion of households spends 16–30 minutes in Bandarban to collect both types of water. (BCR)

However, in case of Cox's Bazar, there has no such type census survey report.

Using type of water	Minute	Bandarban	Kagrachhari	Rangamati	Total
	<=15	76.53	83.43	85.39	82.78
	16 - 30	20.69	14.46	12.46	14.96
Drintring	31 - 45	1.95	1.66	1.66	1.72
Dillikilig	46 - 60	0.61	0.35	0.42	0.43
water	61 and above	0.22	0.09	0.08	0.11
-	Total	100.00	100.00	100.00	100.00
	Respondents	47,845	95,995	90,895	234,735
	<=15	76.58	83.41	85.37	82.78
	16 - 30	20.65	14.48	12.47	14.96
Cooking water	31 – 45	1.94	1.66	1.65	1.71
	46 - 60	0.60	0.36	0.43	0.43
	61 and above	0.23	0.11	0.08	0.12
	Total	100.00	100.00	100.00	100.00
	Respondents	47,845	95,995	90,894	234,734

Table 5-7: Time Spent for Collecting Water

Source: %1: CHT Baseline Census Report (2010, Water Aid)

Table 5-8 shows distance of source of drinking water that most of the households were distant. Considering minimum distance 50 meter following the national standard of GoB, 66% of all households had to collect water from distant sources. The highest proportion of households in Bandarban (74%) had remote source of drinking-water, followed by Rangamati. A similar pattern can be observed for cooking-water in all the districts. (BCR) Cox's Bazar district has no same type of data

Using type of water	Distance		Total			
Using type of water	Distance	Bandarban	Khagrachhari	Rangamati	Total	
	<= 50 meter	26.48%	40.34%	31.34%	34.03%	
	51 to 100 meter	23.09%	22.69%	26.65%	24.30%	
Drinking water	> 100 meter	50.43%	36.98%	42.02%	41.67%	
	Total	100.00%	100.00%	100.00%	100.00%	
	Respondents	47,845	95,995	90,895	2,34,735	
Cooking water	<= 50 meter	26.50%	40.38%	31.43%	34.08%	
	51 to 100 meter	23.10%	22.68%	26.59%	24.28%	
	> 100 meter	50.40%	36.95%	41.98%	41.64%	
	Total	100.00%	100.00%	100.00%	100.00%	
	Respondents	47,845	95,995	90,895	2,34,735	

Table 5-8: Distance of Source of	Water k	by Category
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Source: X1: CHT Baseline Census Report (2010, Water Aid)

5.1.7 Water Use and Spending

Table 5-9 shows that Daily average use of water was found to be the highest on Bandarban, followed by Khagrachhari and Rangamati. On average, poor households use more water than non-poor ones (BCR). Cox's Bazar district has no same type of data.

District	Mean	Non-Poor	Poor (Moderate)	Poor (Extreme)
Bandarban	98.31	93.60	101.97	106.17
Khagrachhari	92.86	83.89	94.48	99.39
Rangamati	78.14	82.55	90.97	89.09

Source: CHT Baseline Census Report (2010, Water Aid)

Table 5-10 explains the average cost of obtaining water per month. Even though the daily consumption of water was lowest in Rangamati, households of this district spend highest amount for water collection. On the other hand, in part of the Khagrachhari district, the expense was significantly low compared to other districts. It is also worth-mentioning that the non-poor households spend higher even if their quantity of consumption was lower than the poor ones in all the districts. This was due to the fact that poor households collect water mostly from non-payable and public sources. (BCR). Cox's Bazar district has no same type of data.

District	Mean	Non-Poor	Poor (Moderate)	Poor (Extreme)
Bandarban	5.57	9.80	1.87	1.40
Khagrachhari	0.18	0.27	0.15	0.12
Rangamati	6.14	8.84	1.72	1.90

Table 5-10: Expenses for Water Collection (TK/month)

Source: CHT Baseline Census Report (2010, Water Aid)

5.1.8 Community Perception on Quality of Drinking Water

A common pattern can be observed in all the three districts in terms of responding about the quality of water that the CHT population drinks. Majority of them were unaware of the quality

of the drinking-water. However, those who were conscious reported that the quality was good. (BCR). Cox's Bazar district has no same type of data.



Figure 5-4: Quality of Drinking-Water

Table 5-11: Quality of I	Drinking-Water	(Percent of Real	spondents)
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District	Good	Moderate	Not Good	Do Not Know	Total	Respondents
Bandarban	36.04	4.44	10.50	49.02	100.00	47,845
Khagrachhari	49.17	2.32	2.93	45.59	100.00	95,995
Rangamati	40.45	6.43	6.46	46.66	100.00	90,894
~ ~ ~ ~						

Source: CHT Baseline Census Report (2010, Water Aid)

Majority of the respondents identify that water was unclean in all the districts. Amongst others, salty/bad taste of water had been recognized to be the topmost reason of bad quality of drinking-water, followed by salty/bad taste and contamination. (BCR). Cox's Bazar district has no same type of data.

Reasons	Bandarban	Khagrachhari	Rangamati	Total	Respondents
More iron	0.58	6.37	0.83	1.94	457
Salty/bad taste	3.54	9.88	11.61	8.84	2,080
Unclean	79.85	80.96	86.01	83.10	19,562
Bad smell	2.82	12.51	2.06	4.52	1,063
Contaminated	13.53	3.61	1.19	5.38	1,266
Arsenic present	0.01	0.08	0.01	0.03	6
Others	0.61	0.68	1.59	1.10	260
Total	100.96	114.08	103.30	104.91	23540

Source: CHT Baseline Census Report (2010, Water Aid)

5.1.9 Supplier of the Technology

Water technology was mainly supplied by the government institutions and NGOs besides personal initiatives. These three combine almost 98% as the supplier of the water technology in Bandarban, Khagrachhari, and Rangamati. In Khagrachhari, the personal initiative was higher enough than the government and NGOs. However, Bandarban has received greater supply from the government amongst the districts of CHT. (BCR). Cox's Bazar district has no same type of data.

District	Government	NGO	Personal	Joint ownership	Neighbour	Natural	Total
Khagrachhari	21	11	68	0	0	0	15,368
Rangamati	42	16	41	1	0	0	5,368
Bandarban	53	22	24	1	0	1	1,621
Total	28	13	59	0	0	0	22,357

Table 5-13: Supplier Ratio of the Water Technology and a Total Number of Water Devices

Source: CHT Baseline Census Report (2010, Water Aid)

5.1.10 Water Availability

Water was available in most of the sources for 9 to 12 months; however, the pattern of availability differs for one or two months across the three districts. Following table shows water availability from the different sources. (BCR) Cox's Bazar district has no same type of data.

Month	Khagrachhari	Rangamati	Bandarban	Total
1-3 month	0.20%	1.30%	1.60%	0.50%
4-6 month	1.60%	8.40%	18.80%	4.20%
7-9 month	0.40%	2.30%	5.50%	1.20%
9-12 month	97.80%	88.00%	74.10%	94.10%
Total	100.00%	100.00%	100%	100.00%

Table 5-14: District-Wise Water Availability in a Year

Source: CHT Baseline Census Report (2010, Water Aid)

In most of the tube wells water well available for 9 to 10 months, whereas the other technologies were sometimes useful for 11 to 12 months. For instance, in Bandarban, shallow tube-well, ring well, and DPHE supply lines had been in use for less than 10 months, whereas water was available from these types of sources for more than 10 months in the other two districts. Again, the availability in all seasons was also important as there are some differences between the water availability in between rainy season and summer. Following table explain the average months of water available in a year by Technol (BCR). Cox's Bazar district has no same type of data.

	Khagra	achhari	Rang	amati	Banda	arban
District	Average	Number of	Average	Number of	Average	Number of
	Months	Technology	Months	Technology	Months	Technology
Deep tube-well	11.18	1,776	10.44	1,883	10.91	423
Shallow tube-well	11.86	13,163	11.21	1,274	9.21	231
Ring well	9.68	391	9.17	1,936	9.77	819
DPHE supply line			11.33	9	9.2	15
Tara dev	10.86	21	7.18	145	10.36	32
Dug well/Pat well	12	1	5.5	6	11.45	11
GFS	12	1	12	18	10.27	58
GFS cum rain water			6	4		0
Rain water	6	1	3	5		0
IFG	12	4	10.82	51	11.29	27
IFW	12	1	11.14	28		0
Lake water	12	4	12	1		0
Fall water	12	2	12	2	12	5
KPM supply line	12	2	12	2		0
Other	12	1	9	4		0
Total	11.72	15,368	10.07	5,368	10.05	1,621

Table 5-15: Months of Water Available in a Year by Technology

Source: CHT Baseline Census Report (2010, Water Aid)

5.2 Khagrachhari District

5.2.1 Basic Information

(1) Outline of Water Supply and Sanitation

Table 5-16 shows upazila wise option wise proportion of population using improved drinking water source. According to the data, Khagrachhari Sadar Upazila has the highest proportion of population who were using improved water source and it was 85.4%, with respect to the Lakshmichhari (32.3%) and Dighinala (58.1%).

Table 5-16: Proportion of Population Using an Improved Drinking Water Sourceby Upazila (%)

						Main so	urce of d	rinking	water						I	(%)		
				l	mproved	sources					Uni	mprove	d source	s	I	tter (ers	
Upazila	Piped into dwelling Piped into yard or plot 		Shallow tube well (<500 feet)	Deep tube well (500+ feet)	Protected well Protected spring		Rainwater collection	Pond Sand Filter		Unprotected well		Surface water	Other	Total (%)	Improved source of drinking w	Number of household men		
Dighinala	0.3	0	0	44.4	0.6	7.6	5.3	0	0	0	31	4.6	6.2	0.1	100	58.1	2,457	
Khagrachhari Sadar	2.8	0.2	0.3	75.2	4.7	2.2	0	0	0	0	8.3	5.1	1.1	0	100	85.4	3,475	
Lakshmichhari	0	0	0	23.6	1.9	4.3	2.6	0	0	0	11.7	7	3.9	45	100	32.3	2,276	
Mahalchhari	0.2	0	0	57.6	2.9	2.4	0.1	0	0	0	29.9	5.6	1.3	0	100	63.1	2,376	
Manikchhari	0	0.2	0	70.2	2.4	4.6	0	0	0	0	18.2	2.8	1.5	0.1	100	77.4	2,539	
Matiranga	0	0	1.8	64.2	3.6	2	0.4	0.2	0	0	13.6	13.8	0	0.4	100	72.2	3,520	l
Panchhari	0.2	0	0	62.4	3.6	4.6	0.3	0	0	0	10.2	18.2	0.4	0	100	71.2	2,178	
Ramgarh	0	3.5	1	61	3.5	0.6	0.2	0.1	0	0	15	9.8	4.8	0.5	100	69.9	3,075	D

Source: Key Findings of the Bangladesh Multiple Indicator Cluster Survey 2009 (UNICEF)

(2) 2011–2012 Budget of DPHE Khagrachhari

Table 5-17 shows allocated budget of 2011–2012 for DPHE Khagrachhari. The total budget was about fifteen million taka and consisted of test boring, Maintenance for Urban water supply, rural water supply and sanitation.

Project	activity	Budget
1. Assessment Project	Test boring, 20 nos	373,600.00
2. Municipality water supply	Maintenance of 2 water supply units and	24,49,968.00
development & extension project	assessment of 2	
3. GoB Unicef Project	Water supply in rural & town areas, scool	1,15,50,104.00
	sanitation and health education	
4. Special Rural wate supply project	Installation of water sources	7,00,000.00
5. Public Health & water supply		2,49,824.00

 Table 5-17: Annual Budget of DPHE, Khagrachhari for 2011–2012

Source: DPHE Khagrachhari office

5.2.2 Current Situation of Water Supply

Table 5-18 shows total number of installed active water supply device by device type. With respect to STW, 12,939 STWs were found by BCR however 1,573 were registered by DPHE as actives device. There for, it is clear that a lot of private STWs were installed by own initiative.

On the other hand, Ring well and Rainwater harvesting had different outcome. Value of those devices by BCR is match less than DPHE value. It will be expected that there will be a number of Ring well and Rainwater harvesting devices found abandoned after installation because no water in dry season and no one maintanain the installed water propery.

Table 5-18: Number of Existing Water Supply Devices

Data Source	STW	Ring well	DTW∕ Tara−deb∕ Tara	Rain water harvesting	GFS	IFG/ IFW	Other	total
BCR	12,939	391	1,811	1	1	5	10	15,158
DPHE	1,573	2,133	2,106	14	0	24	0	5,850

Source: BCR: CHT Baseline Census Report (2010, Water Aid); DPHE: DPHE Khagrachhari office.

5.2.3 Result of Water Quality Test

Table 5-19 shows results of water quality test in Khagrachhari District.



(1) Simana Para Village, Merung Union, Dighinala Upazila

Figure 5-5: Sampling Points in Merung Union

All samples are collected from surface water. K-1-01 water source is used for bathing and washing by villagers. K-1-02 and 1 K-1-03 water sources are used as drinking water. Coliform bacteria were detected in all samples but the water quality was within the normal range as surface water.



(2) Uttor Santipur Village, Gomti Union, Matiranga Upazila

Figure 5-6: Sampling Points in Gomti Union

All samples are collected from STW. The pH level of all samples is 5.4 to 6.4 and EC value is around 100μ s/cm. Iron was detected in K-2-01, K-2-02, K-2-04, K-2-05 and K-2-06. Ammonium was detected in all samples.

(3) Khagrachhari City

Water samples are collected from STW, production wells, and river water. STW will be divided into two groups based on iron concentration. One group has low concentration of iron

(K-3-02 and K-6-02) and the other has high concentration (7 to 14 mg/L) of iron (K-4-01, K-4-03, K-6-01). The pH level of this group indicated low acid.



Figure 5-7: Sampling Points in Khagrachhari City

Table 5-19: Water Quality Test Results in Khagrachhari

(-) = -8	7) = -88 =8 =8-																		
		Type of	well				water												
	Sampling	water	depth		EC	ORP	temp.	NO ₃	NO ₂	NH_4	Fe	Mn	As					General	Colif.
ID	data	source	(m)	pH	(µS/cm)	(mv)	(°C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
Standards	for drinking v	vater, Bangl	adesh	6.5-8.5	-	-	-	10	<1	-	0.3-1.0	0.1	0.05	-	-	-	-	-	-
K-1-01	2012/1/27	Pond	-	8.2	152	208	24.0	ND	ND	1.0	0.5	ND	ND	-	ammonium	Brownish yellow	Mild	23	132
K-1-02	2012/1/27	River	-	8.4	145	238	14.3	ND	ND	ND	ND	ND	ND	-	No odor	Clear	ND	32	82
K-1-03	2012/1/27	Spring	-	7.4	31	138	22.6	ND	ND	0.2	ND	ND	ND	tasteless	No odor	light brown	ND	38	18

(1) Dighinala Upazila, Merung Union, Simana Para Village

(2) Matiranga Upazila, Gomti Union, Uttor Santipur Village

		Type of					water												
	Sampling	water	well		EC	ORP	temp.	NO ₃	NO_2	NH_4	Fe	Mn	As					General	Colif.
ID	data	source	depth	pH	(µS/cm)	(mv)	(°C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
K-2-01	2012/1/28	STW	21.0	6.4	105	119	24.7	ND	ND	0.3	3.0	1	ND	tasteless	No odor	Clear	ND	24	0
K-2-02	2012/1/28	STW	19.8	5.9	66	227	25.1	ND	ND	0.3	0.2	ND	ND	little iron	little ammonia	Clear	ND	50	0
K-2-03	2012/1/28	STW	18.3	5.7	62	274	25.3	ND	ND	ND	ND	ND	ND	tasteless	little iron	Clear	little	21	0
																	Slightly		
K-2-04	2012/1/28	STW	16.0	6	73	207	23.8	ND	ND	0.3	0.7	ND	ND	tasteless	Slightly ammonia	Clear	turbid	118	20
K-2-05	2012/1/28	STW	36.5	5.4	43	239	25.0	ND	ND	0.1	0.6	ND	ND	tasteless	Slightly iron	Clear	ND	52	0
K-2-06	2012/1/28	STW	16.0	5.5	48	248	25.6	1.0	ND	0.1	0.1	0.2	ND	little iron	No odor	Clear	ND	1	0
K-2-07	2012/1/28	STW	22.8	5.7	47	312	24.8	ND	ND	0.1	ND	ND	ND	tasteless	No odor	Clear	ND	52	78
K-2-08	2012/1/28	STW	16.0	5.7	37	281	24.7	0.5	ND	0.1	ND	ND	ND	tasteless	No odor	Clear	ND	-	0
K-2-09	2012/1/28	STW	16.0	5.9	39	318	24.8	ND	ND	0.1	ND	ND	ND	tasteless	No odor	Clear	ND	-	0

(3) Khagrachhari City

		Type of					water												
	Sampling	water	well		EC	ORP	temp.	NO_3	NO_2	NH_4	Fe	Mn	As					General	Colif.
ID	data	source	depth	pН	(µS/cm)	(mv)	(°C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
																	little		
K-3-01	2012/1/29	River	-	7.2	104	173	19	ND	ND	0.3	0.2	ND	-	-	little Ammonia	Clear	turbid	84	0
																	No		
K-3-02	2012/1/29	STW	122.0	7.9	40	106	19	ND	ND	0.5	ND	ND	-	tasteless	No odor	Clear	turbidity	56	0
K-4-01	2012/1/30	STW	30.5	5.9	161	96	24.4	ND	ND	1	14	0.5	ND	tasteless	Slightly iron	Clear	ND	84	0
		Treated of															little		
K-4-02	2012/1/30	K4-03	-	7.9	158	210	21	ND	ND	0.2	ND	ND	ND	tasteless	No odor	Clear	turbid	56	0
K-4-03	2012/1/30	STW	-	6.6	149	54	24.3	ND	ND	0.7	12	ND	ND	little iron	Slightly iron	Clear	ND	63	0
K-4-04	2012/1/30	Production	46.0	6.3	115	312	25.3	4	ND	ND	ND	ND	ND	tasteless	No odor	Clear	ND	89	61
K-4-05	2012/1/30	Production	85.0	6.8	160	6	24.8	ND	ND	0.7	9	ND	ND	-	Slightly iron	Clear	ND	2	0
K-4-06	2012/1/30	Treated	85.0	7.5	152	189	23	0.1	ND	ND	ND	ND	-	tasteless	No odor	Clear	little	72	150
K-6-01	2012/1/31	STW	24.0	6.1	113	49	24.2	ND	ND	0.5	7	ND	ND	little iron	little ammonia	Clear	ND	-	-
K-6-02	2012/1/31	STW	24.0	-	-	212	25.2	ND	ND	0.1	0.6	ND	ND	tasteless	little iron	Clear	ND	-	-
																Brownish			
K-6-03	2012/1/31	River	-	7.8	176	213	22.1	ND	ND	0.6	0.1	0.5	-	tasteless	No odor	green	Mild	-	-

5.3 Rangamati District

5.3.1 Basic Information

(1) Outline of Water Supply and Sanitation

The proportion of population using an improved drinking water source by district is 47% by BCR and 66.5% by MICS. However, by upazila Rajasthali Upazila had the highest proportion (91.9%) followed by Rangamati city (82.4%), because groundwater is a feasible option in those areas. On the other hand, Barkal had lowest proportions (25.7%), because groundwater is mostly not a feasible option.

Table 5-20: Proportion of Population Using an Improved Drinking Water Source	e
by Upazila (%)	

						Main so	urce of d	Irinking	water							(%	
				!	mproved	sources	s				Un	improve	d source	es	1	tter ('	ers
Upazila	Piped into dwelling	Piped into yard or plot	Public tap/ standpipe — — — — — — — — —	Shall ow tube well (<500 feet)	Deep tube well (500+ feet)	Protected well	Protected spring	Rainwater collection	Pond Sand Filter	Bottled water	Un protected well	Unprotected spring	Surface water	Other	Total (%) — — — — — — — — —	Improved source of drinking w	Number of household memb
Baghaichhari	0	0.5	0.1	50	1.9	2.5	1.3	0	0	0	19.4	24.3	0	0	100	56.3	2,961
Barkal	0	0	0	8.7	1.5	9.4	5.7	0	0.4	0	36.6	32.2	5.4	0	100	25.7	2,626
Kaw khali (betbunia)	0.2	1.2	0	57.5	1.3	3.2	8.5	0.3	0	0	19.2	8.3	0.4	0	100	72.1	2,264
Belai chhari	0	0	0	50.8	0.7	6	12.4	0	0	0	1	22.5	6.7	0	100	69.9	2,427
Kaptai	4.5	1.2	15.3	32.3	0	5.1	8.1	0	0	0	9.4	4	20	0	100	66.6	2,428
Jurai chhari	0	0	0	33.3	3.2	2.1	7.1	0	0	0	37.1	16.6	0.6	0	100	45.7	2,199
Langadu	0.3	0	0	27.7	1.5	35.9	4.2	0	0	0	13.6	6.7	9.5	0.8	100	69.5	2,758
Naniarchar	0	0.3	0	27.1	2.5	34	5.6	0	0	0	23.9	6.7	0	0	100	69.4	2,486
Rajasthali	0.6	0	0	82.4	0.7	7.2	0.9	0	0	0.2	1.6	4.6	1.9	0	100	91.9	2,305
Rangamati Sadar	5.8	3.7	7.8	32.6	26	4.4	1.5	0	0	0.5	8.1	2.1	7	0.4	100	82.4	4,430

Source: Key Findings of the Bangladesh Multiple Indicator Cluster Survey 2009 (UNICEF)

(2) 2011–2012 Budget of DPHE Rangamati

Table 5-21 shows allocated budget of 2011–2012 for DPHE Rangamati. The total budget was eight million taka, which is lowest level among CHT circles of DPHE. Of the total budget, only 2.9 million was allocated for rural water supply and no allocation for water supply devices for surface water.

Name of the Project / Development activity	Major Acti	vities	Budget in BDT	Remarks
Bagaichari water supply	1.	Boundary wall and pump house construction		
project	2.	Test boring of 2 nos 38 mm dia well	26.00.000.00	
	3.	Test boring of 2 nos 38 mm dia well	26,00,000.00	
	4.	Installation of 300 x 100mm dia production well		
Construction of Rangamati	1.	Site development for the water treatment plant		
District School Reservoir and	2.	Laying of 150 mm dia pipeline from Rangamati		
water supply in the nearby	mosq	ue to District School		
area	3.	Laying of 100mm dia pipeline along DC Bunglow	25,00,000.00	
	road			
	4.	Laying of 100mm dia pipeline in Sornatila area		
	5.	Procurement of logistics		
Special rural water supply	1.	Installation of Ring Well (159 Nos)		Received materials supply for 225
project	2.	Installation of Shallow Tara (146 Nos)	29,00,000.00	set of water technologies
	3.	Installation of Deep Tara (100 Nos)		
	Total	Fund Received	80,00,000.00	
	Total amou	nt of Fund requested	1,62,73,881.00	
S	hortfall of F	und in the FY 2010-11	82,73,881.00	

 Table 5-21: Annual Budget of DPHE, Rangamati for 2011–2012

Source: DPHE Rangamati Office

5.3.2 Current Situation of Water Supply

Table 5-22 shows the total number of installed active water supply device by device type. With respect to STW, 1,219 STWs were found by BCR; however, 984 STWs were registered by DPHE as active devices. Therefore, it is assumed that installing STW is very difficult due to hard rock compared to ring well and rainwater harvesting. Value of those devices by BCR was less than the DPHE value. According to interviews with the Regional development council, GFS is one of the feasible water supply devices in this district.

Data Source	STW	Ring well	DTW/ Tara-deb/ Tara	Rain water harvesting	GFS	IFG/IFW	Other	total
BCR	1,219	1,936	2,009	5	22	79	24	5,294
DPHE	984	2,997	2,639	0	0	19	0	6,639

Table 5-22: Number of Existing Water Supply Devices

Source: BCR: CHT Baseline Census Report (2010, Water Aid); DPHE: DPHE Khagrachhari office.

5.3.3 Result of Water Quality Test

(1) Rangamati City

Water samples are collected from a STW, a ring well and a purification plant for drinking water. pH levels indicated low acidity, and high concentration of nitrogen was detected in STW and ring well.



Figure 5-8: Sampling Points in Rangamati City

(2) Mogh Paravillage/ Sagu Paravillage/ Kuki ParaVillage, Bandukvanga Union, Rangamati SadarUpazila

Water samples were collected form 7 springs and 2 STWs. All springs and STWs indicated pH levels of low acid (5.8 to 6.6). Low level ammonia was detected in all water samples. High concentration of iron was detected in R-2-08.



Figure 5-9: Sampling Points in Bandukvanga Union

(3) Kaptai Lake

All samples were collected from Kaptai Lake. Water quality indicated normal levels. The pH level was 7.2 to 7.9 and EC was around $100\mu g/L$. Coliform Bacteria was not detected in center of Kaptai Lake (R-2-11). However, nitrogen and high concentration of Coliform Bacteria was detected in R-2-12 sampling point from the Rangamati city side.



Figure 5-10: Sampling Points in Kaptai Lake

(4) Barogonia Tonchangya Para Village, Chandraghona Union, Kaptai Upazila

Water samples were collected from tow ring wells, tow STWs and tow springs. STWs and springs had medium level of EC. Only springs had high concentration of Coliform Bacteria. Other water quality results were of normal levels.



Figure 5-11: Sampling Points in Chandraghona Union

Table 5-23: Water Quality Test Results in Rangamati District

(1) Rangamati City

		Type of	well				water												
	Sampling	water	depth		EC	ORP	temp.	NO ₃	NO ₂	NH_4	Fe	Mn	As					General	Colif.
ID	data	source	(m)	pH	(µS/cm)	(mv)	(°C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
Standard	s for drinking	water, Bang	ladesh	6.5-8.5	-	-	-	10	<1	-	0.3-1.0	0.1	0.05	-	-	-	-	-	-
R-1-02	2012/2/2	STW	20	5.9	121	204	24.4	10	ND	0.4	0.4	ND	ND	tasteless	little Ammonia	Clear	ND	43	0
R-1-03	2012/2/2	DW	20	5.3	152	289	26.5	45	ND	0.1	ND	ND	ND	tasteless	No odor	Clear	ND	50	180
R-1-04	2012/2/2	PWSS	-	7.4	116	242	26.4	0.7	ND	0.1	0.2	ND	-	tasteless	No odor	Clear	ND	57	287
R-1-05	2012/2/2	PWSS	-	7.4	111	236	22.5	0.4	ND	0.7	ND	ND	-	tasteless	No odor	Clear	little turbid	64	109

(2) Mogh Paravillage/ Sagu Paravillage/ Kuki ParaVillage, BandukvangaUnion, Rangamati SadarUpazila

	0 1	Type of	well		FC	ODD	water	NO	NO	NUT	Г	м						0 1	G 116
ID	data	source	(m)	рH	EC (uS/cm)	(mv)	(°C)	NO ₃ (mg/L)	(mg/L)	NH_4 (mg/L)	re (mg/L)	Mn (mg/L)	As (mg/L)	taste	odor	color	turbidity	Bacteria	Colif. Bacteria
R-2-01	2012/2/4	Spring	-	6.3	93	241	21.4	ND	ND	0.2	ND	ND	ND	tasteless	No odor	Clear	ND	137	12
R-2-03	2012/2/4	Spring	-	6.3	107	268	21.8	ND	ND	0.2	ND	ND	ND	tasteless	No odor	Clear	ND	199	0
R-2-04	2012/2/4	Spring	-	6.3	186	282	22.9	0.5	ND	0.1	ND	ND	ND	tasteless	No odor	Clear	ND	92	0
R-2-05	2012/2/4	Spring	-	6.3	230	266	20.8	0.5	ND	0.1	ND	ND	ND	-	little Ammonia	Clear	ND	118	107
R-2-06	2012/2/4	Spring	-	5.8	61	275	22.7	ND	ND	0.3	ND	ND	-	tasteless	little Ammonia	Clear	ND	106	98
R-2-07	2012/2/4	Spring	-	6.1	82	289	22.6	ND	ND	0.2	0.1	ND	-	tasteless	little Ammonia	Clear	ND	49	15
R-2-02	2012/2/4	STW	-	6.6	105	137	24.9	1.5	ND	0.3	0.7	ND	ND	little iron	little iron	Clear	ND	0	0
R-2-08	2012/2/4	STW	21	6.4	138	15	26.1	ND	ND	0.9	20.0	ND	ND	Iron	Iron	Clear	ND	6	0

(3) Kaptai Lake

	Sampling	Type of	well		EC	OPP	water	NO	NO	NH	Fo	Mn	A .c					Gamaral	Colif
ID	Sampling	water	(m)		EC (u S (am))	(my)	(C)	(m_2/L)	(m_0/L)	(m_2/L)	(ma/L)	(ma/L)	AS (ma/L)	tooto	odor	0.010.0	analai dian	Denteral	Com.
ID	uata	source	(111)	рп	(µS/cm)	(IIIV)	(\mathbf{U})	(Ing/L)	(Ing/L)	(Ing/L)	(mg/L)	(Ing/L)	(mg/L)	taste	odor	COLOL	turbialty	Dacterra	Dacterra
R-3-01	2012/2/5	DW	12.2	6.8	300	87	24	0.2	ND	0.8	0.6	ND	ND	little iron	little iron	Clear	little turbidity	9	0
R-3-02	2012/2/5	STW	61	7.7	510	103	25.6	ND	ND	1.5	1.0	ND	ND	little iron	little iron	Clear	very little turbidity	0	0
R-3-03	2012/2/5	Spring		6.7	200	210	21.2	ND	ND	0.2	ND	ND	-	tasteless	No odor	Clear	little turbidity	82	138
																	Very little		
R-3-04	2012/2/5	STW	61	8.7	750	4	25.4	ND	ND	1.0	0.1	ND	ND	tasteless	Ammonia	Clear	turbidity	42	39
R-3-05	2012/2/5	DW	12.2	6.8	570	50	25.9	ND	ND	0.3	0.8	ND	ND	tasteless	No odor	Clear	ND	16	153
R-3-06	2012/2/5	Spring	12.2	6.8	166	193	20.9	ND	ND	ND	ND	ND	-	tasteless	No odor	Clear	ND	103	180
															little		Very little		
R-3-07	2012/2/5	STW	60	8.0	370	25	25.1	ND	ND	0.2	0.1	ND	ND	tasteless	ammonia	Clear	turbidity	25	0
R-3-08	2012/2/5	DW	13	6.8	250	113	24.2	ND	ND	0.2	0.2	ND	ND	tasteless	No odor	Clear	ND	36	180

(4) Barogonia Tonchangya Para Village, Chandraghona Union, Kaptai Upazila

		Type of	well				water												
	Sampling	water	depth		EC	ORP	temp.	NO ₃	NO_2	NH_4	Fe	Mn	As					General	Colif.
ID	data	source	(m)	pН	(µS/cm)	(mv)	(°C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
R-1-01	2012/2/2	Lake		7.5	106	225	21.3	0.5	ND	0.1	ND	ND	-	-	No odor	Clear	ND	87	124
R-2-09	2012/2/4	Lake	-	7.4	107	169	24.4	ND	ND	0.6	ND	ND	-	-	little Ammonia	greenish	little turbidity	21	120
R-2-10	2012/2/4	Lake	-	7.9	97	229	22.7	ND	ND	0.2	ND	ND	-	-	No odor	Clear	ND	0	1
R-2-11	2012/2/4	Lake	1	7.9	97	239	23.8	ND	ND	0.2	ND	ND	-	-	No odor	Clear	ND	5	0
R-2-12	2012/2/4	Lake	-	7.2	103	265	23.4	1.5	ND	0.6	ND	ND	-	-	No odor	Clear	ND	82	87

5.4 Bandarban District

5.4.1 Basic Information

(1) Water Supply and Sanitation

The proportion of population using an improved drinking water source by District was 48% by BCR and 67.8% by MICS. However, by upazila, Lama Upazila had the highest proportion (71.6%), because this area is able to use groundwater. On the other hand, Tanchi Upazila had the lowest proportion (37.9%), because groundwater is mostly not feasible. In the case of Ruma Upazila, there is a distinguishing characteristic that 50.6% of the total population is using Protected Spring.

Table 5-24: Proportion of Population Using an Improved Drinking Water Sourceby Upazila (%)

						Main so	urce of d	rinking	water						I	(%)	
					mproved	sources	·				Uni	mprove	d source	es	1	tter (ers
Upazila	Piped into dwelling	Piped into yard or plot	Public tap/ standpipe	Shallow tube well (<500 feet)	Deep tube well (500+ feet)	Protected well	Protected spring	Rainwater collection	Pond Sand Filter	Bottled water	Unprotected well	Unprotected spring	Surface water	Other	Total (%)	Improved source of drinking wa	Number of household memb
Alikadam	6.8	3.8	8.8	9.1	11.7	13	3.4	0	0	0	6.9	0	36.4	0	100	56.7	2,583
Bandarban Sadar	3.6	4.7	9.9	20.8	11.4	22.5	4.1	0.1	0.1	0	2.2	0.1	18.2	2.2	100	77.3	4,509
Lama	0	0.3	1.1	59.7	9.4	2.5	4.1	0.1	0.8	0	4	4.8	12.6	0.4	100	78.1	3,152
Naikhongchhari	3.2	0.7	2.9	17.6	20.1	16.2	2.4	0	0	0.3	8.4	13.5	13.9	0.8	100	63.5	2,641
Row angchhari	0	8.7	3.7	13.4	1.1	5.6	21.2	0	0	0	0	10	36.3	0	100	53.7	2,275
Ruma	0	0.1	5.6	0.6	0.7	7	50.6	0	0	0	0	12.1	22.3	0.9	100	64.5	2,468
Thanchi	0	0.3	4.4	0.4	1.3	12	18.4	0.6	0	0.4	0	9.4	47.1	5.6	100	37.9	2,285

Source: Key Findings of the Bangladesh Multiple Indicator Cluster Survey 2009 (UNICEF)

(2) 2011–2012 Budget of DPHE, Bandarban

Table 5-25 shows allocated budget of 2011–2012 for DPHE Bandarban. The total budget was hundred three million taka, which is the highest amount among CHT circle, DPHE. One peculiarity of the budget is that GOB–UNICEF project allocated construction cost for GFS.

Name of the Project / Development activity	Major Activities	Budget in BDT
GoB Unicef Project	1. Ring Well, 74 Nos	7,077,878
-	2. Deep Tube Well, 60 nos	3,621,480
	3. GFS, 19 Nos	38,000,000
	Stairs for water collection, 20 nos	639,982
	Ring Well repair, 95 nos	2,020,650
	total	51,359,990
MoCHTA special allocation	 Water treatment plant, 1 nos 	15,000,000
	2. Water treatment plant partial, 1 no	5,000,000
	3. Test well, 04 nos	348,000
	4. Production well, 2 nos	2,835,622
	5. Booster station, 2 nos	5,000,000
	6. Deep Tube well, 10 nos	1,000,000
	total	29,183,622
Special rural water supply	1. Installation of Ring Well (120 Nos)	11,616,480
project	2. Deep Tube Well	9,804,248
	total	21,420,728
National Sanitation	 Latrine production by dphe manpower, 1400 set 	966,905
programme	Latrine supply by Contractor, 630 set	519,211
	tatol	1,486,116
		103 450 456

Table 5-25	Annual Rudo	et of DPHE	Bandarban	for	2011_2012
Table 5-25.	Annual Duug	JEL OF DE TE,	Danuarban	101	2011-2012

Source: DPHE Bandarban office

5.4.2 Current Situation of Water Supply

Table 5-26 shows total number of installed active water supply device by device type. With respect to STWs, 501 STWs were found by BCR; however, 961 were registered by DPHE as active devices. Therefore, it is expected that installing STW is very difficult due to hard rock. For ring well and rainwater harvesting, the value of those devices by BCR was less than that of DPHE.

Data Source	STW	Ring well	DTW∕ Tara−deb∕ Tara	Rain water harvesting	GFS	IFG/IFW	Other	total
BCR	501	673	416	0	43	17	31	1,681
DPHE	961	2,209	2,052	39	53	10	0	5,324
a bab	OT THE D		D (2010)				1 1 001	

Table 5-26: Number of Existing Water Supply Devices

Source: BCR: CHT Baseline Census Report (2010, Water Aid); DPHE: DPHE Khagrachhari office.

5.4.3 Result of Water Quality Test

(1) Bandarban City

Table 5-27 shows results of water quality test. Water samples were collected from ponds, springs, rivers, STWs and ring wells in Bandarban city. Pond water was highly contaminated by Coliform Bacteria. River water quality was determined from samples from Sang River, which had clear water and quality indicated normal levels. One ring well (B-3-04) was highly contaminated by nitrate. Another STW (B-3-01) contained iron and manganese.



Figure 5-12: Sampling Points of Bandarban City

(2) Senior Para Village, Sadar Union, Bandarban Sadar Upazila

Table 5-27 shows results of water quality test. All samples were collected from the side stream of Sang River. Result of the water quality test showed very low levels of ammonia in all samples. Other water quality item indicated normal conditions.



Figure 5-13: Sampling Points of Sadar Union

(3) Moddhyam Para/ Ranglai Headman Para/ Sing Song Para/ Moddhyam Para, Swalock Union, Bandarban Sadar Upazila

Table 5-27 shows results of water quality test. Water samples were collected from stream water and supplied water by GSFs. All stream water indicated normal water quality as surface water. Nitrate was detected in B-4-07 and Coliform bacteria were detected in all samples.



Figure 5-14: Sampling Points in Swalock Union

 Table 5-27: Water Quality Test Result in Bandarban District

(1) Bandarban City

(1) Duite	iuroun ong	pling			11			-				-							1		1	
	a	Type of water source			well		50	0.000	water	NG	NG										<u> </u>	G 116
-	Sampling				depth		EC	ORP	temp.	NO ₃	NO ₂	NH	4	Fe	Mn	As					General	Colif.
ID	data	Type of	water sou	irce	(m)	рН	(µS/cm)	(mv)	(°C)	(mg/L)	(mg/L)	(mg/	L) (mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
						6.5-								0.3–								
Standards	s for drinking	water, Bang	gladesh			8.5	-	-	-	10	<1	-		1.0	0.1	0.05	-	-	-	-	-	-
																			Not	High		
B-1-01	2012/2/8	Pond			-	9.1	460	184	25.5	ND	ND	0.3	;	0.1	ND	-	-	Little Amonia	clear	turbidity	101	395
		GFS (sou	rce B-01-	-02),																		
B-1-02	2012/2/8	Тар			-	7.9	260	268	25.4	ND	ND	0.1		0.1	ND	-	tasteless	No odor	Clear	ND	50	260
		River (ou	tlet of sup	pply																		
B-1-03	2012/2/8	pipe)			-	-	-	-	-	-	-	-		-	-	-	-	No odor	Clear	ND	10	94
B-3-01	2012/2/10	STW			55	5.8	380	125	25.3	ND	ND	0.2	2	5.0	2.0	ND	tasteless	Little amonia	Clear	ND	40	0
B-3-02	2012/2/10	River			-	8.2	260	178	23.3	ND	ND	0.1		ND	ND	-	-	No odor	Clear	ND	40	38
B-3-03	2012/2/10	PWSS (tr	eated wat	teer)	-	8.0	270	227	22.7	ND	ND	0.1		0.1	ND	-	tasteless	No odor	Clear	ND	113	105
B-3-04	2012/2/10	DW			5	6.3	280	341	24.6	60	0.04	0.1		ND	ND	-	-	No odor	Clear	ND	52	89
B-3-05	2012/2/10	STW			27	7.9	300	136	26.2	ND	ND	0.1		ND	ND	ND	tasteless	No odor	Clear	ND	0	0
B-3-06	2012/2/10	Spring			-	6.6	200	258	23.1	ND	ND	0.1		ND	ND	-	tasteless	No odor	Clear	ND	16	16
B-3-07	2012/2/10	DW			5	6.8	220	253	23.2	0.3	ND	0.1		0.1	ND	-	-	Little Iron	Clear	ND	25	254
																				1		
(2) Senio	or ParaVilla	age, Sada	arUnion	, Ban	darban	Sadar	Upazila															
		Type of	well	ŕ				water					1									
	Sampling	water depth				EC	ORP	ORP temp.		3 N	O_2	NH4	F	⁷ e	Mn	As					General	Colif.
ID	data	source	urce (m) pH		r u	1S/cm	(mv)	(°C)	(mø/	[.) (mg	(mg/L) (mg/L)		(mg	σ/L.)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
P 2.01	2012/2/0	Spring	()	7.7	7	(µS/cm) (mv)		10.5	ND	ND NI		0.2	(1	ND	(tectalocc	No odor	Clear	ND	51	00
B-2-01	2012/2/9	Spring	-	7.1		79	220	19.5	19.5 ND 1			0.2	0	2	ND	-	tasteress	No odor	Clear	ND	19	72
B-2-02	2012/2/9	Spring	-	7.5	,	19	250	24 ND		· 0.	0.02		0. N		ND	-	-	No odor	Clear	ND	18	12
B-2-03	2012/2/9	Spring	-	7.0)	48	254	4 18.3			D	0.1	N	D	ND	-	-	No odor	Clear	ND	29	46
B-2-04	2012/2/9	Spring	-	7.1	<u> </u>	145	216	21.5	21.5 ND 21.8 ND		D	0.1	0.	.1	ND	-	-	No odor	Clear	ND	23	175
B-2-05	2012/2/9	Spring	-	7.9)	139	209	21.8	ND	N	D	0.2	0.	.1	ND	-	-	No odor	Clear	ND	99	310
(2) M (1)	11. D.	. / D 1	·	т			D. / 1	A. 1.11.	D	. C . 1	1 11	D		1	1							
(3) Mod	anyam Par	a/ Rangia	ai Head	man I	ara/S	ing So	ng Para/ I	viodan	yam Par	a, Swald	JCK Un	on, Ba	andar	ban Sa	idar Upa	zila						
	~				well				water					-							~ .	~
	Sampling				depth		EC	ORP	temp.	NO ₃	NO	2 N	NH_4	Fe	Mn	As					General	Colif.
ID	data	Type of	t water so	urce	(m)	pН	$(\mu S/cm)$	(mv)	(°C)	(mg/L)	(mg/l	L) (m	ıg/L)	(mg/L)) (mg/L) (mg/L	.) taste	odor	color	turbidity	Bacteria	Bacteria
																				Very little		
B-4-01	2012/2/11	Spring			-	8.4	270	254	21.4	ND	ND	1	ND	ND	ND	-	-	No odor	Clear	turbidity	91	105
B-4-02	2012/2/11	Spring			-	7.7	135	46	19	ND	ND	(0.5	0.3	ND	-	-	Little iron	Clear	ND	29	87
B-4-03	2012/2/11	Spring			-	7.9	153	228	22.8	ND	ND	(0.1	ND	ND	-	-	No odor	Clear	ND	10	157
B-4-04	2012/2/11	Spring			-	8.2	186	236	20.9	ND	ND	1	ND	ND	ND	-	tasteles	s No odor	Clear	ND	43	149
B-4-05	2012/2/11	GFS (so	urce B-04	1-03)	-	8.2	155	226	26.7	ND	ND	(0.1	ND	ND	-	-	No odor	Clear	ND	56	228
B-4-06	2012/2/11	GFS (so	urce B-04	-01)	-	8.1	260	219	21	ND	ND	(0.1	ND	ND	-	-	No odor	Clear	ND	73	147
		GFS (so	urce B-04	1-02),		1																
B-4-07	2012/2/11	direct		- ,,	-	7.7	136	369	32.1	1	ND	(0.1	ND	ND	-	-	No odor	Clear	ND	29	104
		GFS (so	urce B-04	-02),		1				1											1	
B-4-08	2012/2/11	Tap 01		- //	-	7.9	137	253	20.1	ND	ND	(0.1	ND	ND	-	-	No odor	Clear	ND	5	99
		GFS (so	urce B-04	-02).																		
B-4-09	2012/2/11	Tap 02		,,	-	7.9	138	256	20.9	ND	ND	(0.1	ND	ND	-	-	No odor	Clear	ND	169	56
												`				-				-		

5.5 Cox's Bazar District

5.5.1 Basic Information

(1) Outline of Water Supply and Sanitation

The proportion of the population using an improved drinking water source by District is 96.6% by MICS. However, by upazila Teknaf Upazila had lowest proportion (90.1%) followed by Moheshkhali Upazila (94.1%). In case of Teknaf Upazila, there is hard rock area that is not suitable for installing tube well and ring well. In case of Moheshkhali Upazila, groundwater samples indicated salinity.

A feasibility survey for a small dam development project was completed by UNICEF. According to the report, a small dam is feasible with 2.5 million US dollar as construction cost. If the small dam functions properly, it can supply water to the entire Teknaf Upazila.

As for urban water supply, Cox's Bazar City and Chakaria City have pipe water supply systems which were installed by DPHE and operated by Pourashabva. In case of Cox's Bazar, water supply capacity is much less than demands, because of rapid development of new hotels and growth of population. In addition, large consumption of groundwater caused a drawdown of water level.

It is known that a part of Ukia Upazila has arsenic contaminated tube wells.

Main source of drinking water															1	(%	
				I	mproved	sources	·				Un	improve	d source	es	I	tter (ers
Upazila	Piped into dwelling	Piped into yard or plot Public tap/ standpipe Shallow tube well (<500 feet) Deep tube well (500 feet) Protected well Protected spring Rainwater collection Pond Sand Filter		Bottled water	Unprotected well	Unprotected spring	Surface water	Other	Total (%) 	Improved source of drinking wa	Number of household mer						
Chakaria	7.6	10.9	7	71.9	0.8	0.4	0.2	0	0	0	0.2	0	0.2	0.7	100	98.9	4,037
Cox's Bazar Sadar	12.1	15.3	5.3	46	18.3	0.1	0.5	0	0	0.2	0	0.6	0.3	1.2	100	97.8	3,716
Kutubdia	0.3	4.4	1.3	51.9	37.1	3.1	0	0	0	0	1.4	0	0	0.5	100	98.2	2,759
Maheshkhali	6.8	16.2	3.8	53.1	13.2	0.8	0.2	0	0	0	0.3	0.1	0	5.5	100	94.1	3,592
Pekua	10.8	4.7	10.9	26.8	46.5	0	0	0	0	0	0.3	0	0	0	100	99.7	2,705
Ramu	0.4	2.3	0	89.6	1.2	1.6	1.2	0	0	0	0	0	3.9	0	100	96.1	3,108
Teknaf	5.3	4.3	8.2	66.9	2.6	2.9	0	0	0	0	2.1	3.8	1.7	2.3	100	90.1	3,632
Ukhia	0.6	7.6	0.7	83.4	3.6	2.2	0	0	0	0	0.3	0	0.7	0.9	100	98	2,855

Table 5-28: Proportion of Population Using an Improved Drinking Water Sourceby Upazila (%)

Source: Key Findings of the Bangladesh Multiple Indicator Cluster Survey 2009 (UNICEF)

(2) 2011–2012 Budget of DPHE, Cox's Bazar

Table 5-29 shows the allocated budget of 2011–2012 for Cox's Bazar. The total budget was 12.5 million taka consisting of test installation of 75 STWs, 175 DTWs, 20 Deep Taras and 5 Shallow Taras.

Name of the Project / Development activity	Major Activities	Budget in BDT
Special rural water supply project	1. Shallow Tube Well, 75 Nos	12,500,000
	2.Deep Tube Well, 175 nos]
	3.Deep Tara, 20 Nos	
	4.Shallow Tara, 5 Nos	
	(Total 275 Nos)	
Municipality pipeline extension	4 km extension (GoB)	

 Table 5-29: Annual Budget of DPHE, Cox's Bazar for 2011–2012

Source: DPHE Cox's Bazar office

5.5.2 Current Situation of Water Supply

Table 5-30 shows the number of installed active water supply devices by DPHE. According to the information, STW is the dominant drinking water source followed by DTW. Depending on groundwater level, Tara Deep will be selected.

Table 5-30: Number of Existing Active Water Supply Devices

T!1-					Type of W	Vater Sources			
Upazita	Shallow	Tara	Tara -2	Deep	Tara Deep	SST/VSST/Sp	PSF/ LG	Ringwell	RWHS
Cox's B.Sadar	1,674	-		1,341	101	10	-	9	-
Ramu	2,038	1		373	81	-	-	25	4
Chokoria	2,695	-		1,491	33	-	-	20	-
Ukhiya	1,553	19		426	295	8	-	20	3
Teknaf	1,334	14		289	44	-	-	157	1
Moheskhali	1,799	3		954	14	4	-	3	-
Kutubdia	690	-		806	-	10	2	-	-
Pekua	185	-		1,120	7	8	-	-	-
Total	11,968	37	-	6,800	575	40	2	234	8

Source: DPHE Cox's Bazar office

5.5.3 Result of Water Quality Test

(1) Cox's Bazar City

Table 5-31 (1) shows the results of water quality test in Cox's Bazar District. Water samples are collected from rivers, STWs and DTWs.

River water samples were collected from the upstream and downstream of a rubber dam in Bakkhali River. Downstream water had high salinity levels (1.1%) because of its location in a tidal zone. However, the EC value of upstream water is only 330 μ s/cm. In the case of STWs, high concentration of EC was detected in C-1-03 and C-3-09, where it is a coastal area.



Figure 5-15: Sampling Points in Cox's Bazar City

(2) Kutupalong Village, Raja Palong Union, Ukhiya Upazila

Table 5-31 (2) shows results of water quality test in Raja Palong Union. Water samples were collected from a pond, a river and 6 STWs. Results of water quality test, pond water and river water indicated normal characteristics. Coliform bacteria were detected in both samples. In case of STW, high concentration of iron was detected in C-2-01, C-2-02, C-2-04 and C-2-10. Arsenic contamination was detected in C-2-10.



Figure 5-16: Sampling Points in Raja Palong Union



Figure 5-17: Sampling Points in Holodia Palong

(3) Mata Vanga Village, Bahar Chara Union, Teknaf Upazila

Table 5-31 (3) shows results of water quality test in Bahar Chara Union. Water samples were collected from the river, IFG, STW and 2 ring wells. Results of water quality test, 2 IFG showed high levels of EC (above 1300 μ S/cm). Other items indicated normal levels. Coliform bacteria were detected in ring wells and river water.



Figure 5-18: Sampling Points in Bahar Chara Union

 Table 5-31: Water Quality Test Results in Cox's Bazar District

(1) Cox's Bazar City

		Type of	well				water												
	Sampling	water	depth		EC	ORP	temp.	NO_3	NO_2	NH_4	Fe	Mn	As					General	Colif.
ID	data	source	(m)	pН	(µS/cm)	(mv)	(°C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
Standards	for drinking v	water, Bang	ladesh	6.5-8.5	-	-	-	10	<1	-	0.3-1.0	0.1	0.05	-	-	-	-	-	-
C-1-01	2012/2/13	River	-	8.7	330	221	21.8	ND	ND	0.1	ND	ND	-	-	No odor	Clear	ND	8	249
					1.1%														
C-1-02	2012/2/13	River	-	7.8	(+)	209	22.6	0.5	0.09	0.5	0.1	ND	-	-	No odor	Clear	ND	178	148
~														-	Little iron &	~			
C-1-03	2012/2/13	STW	12	7.0	800	112	25.3	ND	ND	0.4	15.0	0.25	ND	Iron	amonia	Clear	ND	53	0
C-1-04	2012/2/13	STW	36.5	7.2	250	49	25.7	ND	ND	0.3	2.0	ND	ND	tasteless	Little iron	Clear	ND	0	0
C-1-05	2012/2/13	DW	91	7.3	260	71	26	ND	ND	0.2	1.2	ND	ND	tasteless	Little amonia	Clear	ND	23	0
C-3-09	2012/2/15	DTW	-	7.9	650	60	25.8	ND	ND	ND	ND	ND	ND	Tastless	No odder	Clear	ND	2	0
(0) IZ		x 7º 11	D · ·	D 1	TT •	T TI 1 '	T T	•1											
(2) Ku	tupalong	Village,	, Raja	Palong	Union,	Ukhiya	a Upaz	ıla											
		Type of	well				water												
	Sampling	water	depth		EC	ORP	temp.	NO_3	NO_2	NH_4	Fe	Mn	As					General	Colif.
ID	data	source	(m)	pH	(µS/cm)	(mv)	(°C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
C-2-01	2012/2/14	STW	43	6.1	101	116	25.7	ND	ND	0.2	10.0	ND	ND	Little iron	Little iron	Clear	ND	30	0
C-2-02	2012/2/14	STW	33	6.3	160	7	25.7	ND	ND	0.3	9.0	ND	ND	Little iron	Little iron	Clear	ND	27	0
						1		1				1				Not	Little		
C-2-03	2012/2/14	Pond	-	7.0	65	247	21.3	ND	ND	0.1	ND	ND	-	-	No odor	clear	turbidity	70	107
															Little iron &				
C-2-04	2012/2/14	STW	51.8	6.3	166	12	25	ND	ND	0.3	10.0	ND	ND	Little iron	amonia	Clear	ND	50	140
																Not	Little		
C-2-05	2012/2/14	River	-	7.0	70	261	23.5	ND	ND	0.1	ND	ND	-	-	No odor	clear	turbidity	76	122
C-2-08	2012/2/14	STW	15	7.8	520	340	25.6	1	ND	0.1	0.5	ND	ND	tasteless	No odor	Clear	ND	1	0
															Little				
C-2-09	2012/2/14	STW	7	5.4	139	329	23.8	0.2	ND	6.0	2.0	ND	ND	tasteless	amonia	Clear	ND	14	0
C-2-10	2012/2/14	STW	7	5.9	138	70	25	ND	ND	0.5	18.0	ND	0.025	-	Little iron	Clear	ND	12	0
(3) T(3)) Mata V	anga Vi	llage,	Bahar	Chara U	Jnion, T	Teknaf	Upazila	l										
<u>` / ` `</u>	Í	Type of	well				water	1											
	Sampling	water	depth		EC	ORP	temp.	NO ₃	NO ₂	NH_4	Fe	Mn	As					General	Colif.
ID	data	source	(m)	nН	(uS/cm)	(mv)	ഭവ	$(m\sigma/L)$	$(m\sigma/L)$	$(m\sigma/L)$	(mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria

	Sampling	water	depth		EC	ORP	temp.	NO ₃	NO_2	NH_4	Fe	Mn	As					General	Colif.
ID	data	source	(m)	pH	(µS/cm)	(mv)	(°C)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
C-3-01	2012/2/15	River	-	8.4	480	242	20.8	ND	ND	0.1	ND	ND	-	-	No odor	Clear	ND	71	74
C-3-02	2012/2/15	DW	8.5	7.0	580	259	25.5	ND	ND	0.1	ND	ND	-	tasteless	No odor	Clear	ND	52	174
C-3-03	2012/2/15	IFG	-	7.0	660	119	23.6	2	ND	0.1	0.2	0.5	-	tasteless	No odor	Clear	ND	24	0
C-3-04	2012/2/15	STW	9	7.2	580	157	26.1	5	0.01	0.1	ND	ND	ND	-	No odor	Clear	ND	4	0
C-3-05	2012/2/15	River	-	7.9	620	199	21.2	ND	ND	0.1	ND	ND	-	-	No odor	Clear	ND	44	2
C-3-06	2012/2/15	IFG	-	7.7	1350	42	21.7	ND	ND	0.1	ND	ND	-	Taste salt	No odor	Clear	ND	36	7
C-3-07	2012/2/15	DW	12	7.0	440	25	25.4	0.5	ND	0.1	3.0	ND	ND	Little iron	Little iron	Clear	ND	11	62
C-3-08	2012/2/15	IFG	-	8.1	1450	60	27.5	ND	ND	0.4	1.5	2	-	Little iron	Little amonia	Clear	ND	9	0

5.6 Characteristics and Challenges of Local Industries in CHT and CXB

(1) CHT Area

The following four categories are used for consideration of rural water supply in CHT areas.

- 1) Flat land along a main river or tributary
- 2) Low hills
- 3) High hills
- 4) Lake side or coastal area
- 1) Flat land along a main river or tributary

In the northern part of flat lands in CHT (Khagrachhari, part of Rangamati), most of the area has the possibility of using groundwater, especially Khagrachhari district. Whereas the southern part of CHT (Bandarban, part of Rangamati), there is narrow, flat land and hard rock; therefore there is the possibility to install tube wells but it is costly compared with plain land.

2) Low hills

There are several types of water source (STW, Ring well, Tara pump, spring, River). Therefore, residents of these areas are able to access water sources. The problem is access during the rainy season due to the changing water height between residential area and water source.

3) High hills

Residents of these areas face the problem of collecting water and most of the residents are not able to reach improved water source. The reason is that water source is located at a lower elevation than the residential area and conditions of roads connecting to the main road are not good.

If the water source is located above the residential area, GFS is one water supply device option. Bandarban district, part of Rangamati, is a feasible area for this; otherwise, developing new technology is needed.

4) Lake area

Water source of lake depends on the above mentioned land types. For residents near Kaptai Lake, the lake water is available for use.

(2) CXB Area

97% of the population in the CXB area already has improved safe water, so problem areas are very limited. One problem area is a part of Teknaf Upazila due to hard rock. Another problem area is Moheshkhali Upazila due to groundwater salinity.

According to the above issues, development of a rural water supply plan with scientific surveys as well as new technology for high hill areas is needed.

Table 5-32 shows points to be considered for rural water supply by area category.

Land Category	СНТ	CYB
Elet L en d	L s sate d hasi das a main river	
Flat Land	STW DTW Ding Wall are feasible	STW DTW Ding Well are feesible
	STW, DTW, King wen are leasible	STW, DTW, King wen are leasible
	Southern part of CHT is narrower than	Arsenic in groundwater is detected in a part
	Northern part of CHT	of Ukiya Upazila
Valleys	Tributary area, Groundwater, spring,	Tributary area, Groundwater, spring, pond
&	pond and mini dam are possibilities.	and mini dam are possibilities. Relatively
Low Hills	Relatively close to a water source	close to a water source. Little height
		difference compared with CHT area
	Surface water has bio-contamination	Surface water has bio-contamination risk
	risk	Decrease of water volume in dry season.
	If residential area is located on a low	Need watershed management.
	hill, need to go downhill for water	
	collection.	
	Decrease of water volume in dry season.	
High Hills	GFS is one of feasible water supply	No information
	device options if residential area is	
	located below water source level.	
	If residential area is located above water	
	source level, need go down to water	
	source for a long distance.	
	Decrease of water volume in dry season.	
	Bad road conditions in rainy season	
	This is no option to supply water	
	presently and need to develop new	
	technology.	
Lake side or	Use Kaptai Lake water.	STW, DTW, Ring Well are feasible
Coastal area	STW, DTW, Ring Well are feasible.	GFS, IFG are also feasible.
	Difference of lake water level between	Part of groundwater is saline.
	dry season and rainy season.	Decrease of water volume in dry season for
		GFS and IFG.

Table 5-32: Point of Consideration for Rural Water Supply

6. Possible Cooperation Framework

6.1 Direction and Approach

CHT is steep hilly area and CXB is narrow area between hill and sea. This geographical condition leads to insufficient public service delivery in the area. Improvement of linkage between government agencies and villagers is required to thrust dynamic regional development activities as a collective endeavor of both government and the people in the area. Active utilization of Union Development Coordination Committee Meeting (UDCCM) could be one way to facilitate the linkage.

Such endeavor for regional development being made as so far is reviewed in Chapter 2. However, it is not enough to address the issues in CHT and CXB, especially deforestation and access to safe drinking water which are the urgent issues in CHT. Likewise, sound utilization of natural resources is the important issue in CXB.

Because poverty is prevailing in both CHT and CXB, upgrading livelihoods is considered to be the key issue to sustain any development endeavor. Therefore, improvement of livelihood could be the basis of natural resource management in both CHT and CXB, which includes income generating activities and construction of community infrastructure.

Considering the above, sustainable regional development plan is needed at district level based on objective data. The possible direction and approach are shown as below:



Direction

Initiation of the Satoyama Initiative

To tackle this critical issue, the Ministry of the Environment of Japan and the United Nations University Institute of Advanced Studies (UNU-IAS) jointly initiated the *Satoyama* Initiative. This international effort promotes activities consistent with existing fundamental principles including the Ecosystem Approach. Our core vision is to realise societies in harmony with nature, that is, built on positive human-nature relationships.

With the launch of the International Partnership for the *Satoyama* Initiative at the Tenth Meeting of the Conference of the Parties (COP10) to the Convention on Biological Diversity in October 2010, we intend to officially establish an international platform to accelerate our efforts. The *Satoyama* Initiative is expected to contribute significantly to achieving the three objectives of the Convention.

Source : http://satoyama-initiative.org/en/about-2/

Approach

Theme 1: Divesified income generation

Theme 2: Safe drinking water developemnt

Theme 3: Community infrastructure development

Theme 4: Enhancement of linkage among stakeholders

6.2 Possible Steps

It is ideal to dispatch JICA cooperation preparation mission to confirm the cooperation framework and technical feasibility. However, it is preferable to make quick start of development intervention utilizing the following scheme because the dispatchment of the mission might take time and the issues to be addressed are rather urgent.

- Grant Assistance for Grassroots and Human Security Projects
- Japan Overseas Cooperation Volunteers
- JICA Partnership Program (Grassroots technical cooperation project)

Annex Result of Water Quality Test

		Location Data									water source									water o	uality						
									Name		Туре				water												
						T			of HH	well	oi water		EC	0.000	temp.	NO ₃	NO ₂	NH ₄	Fe	Mn	As					General	Colif.
	Date	District	Upazila	Union	Village	Latitude	Longitude	House Owner	(person)	depth	source	pH 6.5–	(µS/cm)	ORP	(0)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	taste	odor	color	turbidity	Bacteria	Bacteria
Standards Standards	for drinking w	ater, Bangladesh										8.5	-	-	-	10	<1	-	0.3-1.0	0.1	0.05	-	-	-	-	-	-
K-1-01	27-Jan-12	Khagrachhari	Dighinala	Merung	Simana Para											50	5			0.4	0.01			Brownish			
K-1-02	27-Ian-12	Khagrachhari	Dighinala	Merung	Toidu Chara	23°13′9.44″N 23°14′00.95″N	92°00'41.03"E 92°00'38.84"E	Community	-	-	Pond River	8.2 8.4	152	208	24.0	ND ND	ND ND	1.0 ND	0.5 ND	ND ND	ND ND	No tested	ammonium No odor	yellow Clear	Mild++ ND	23	132
K-1-03	27-Jan-12	Khagrachhari	Dighinala	Merung	Simana Para	20 1100.50 11	72 00 20.01 2	Community			luitti	0.1	110	200	1.10	112	112	112	112	112	112	Tto tested	110 0401	Slightly	112		02
						23°12′57.32″N	92°00′53.03″E	Community	-	-	Spring	7.4	31	138	22.6	ND	ND	0.2	ND	ND	ND	Tasteless	No odor	color	ND	38	18
K-2-01	28-Jan-12 28-Jan-12	Khagrachhari	Matiranga Matiranga	Gomti	Uttor Santipur	23°07′10.53″N	91°49′14.45″E	Joynal Abedin	2(10)	21	STW	6.4	105	119	24.7	ND	ND	0.3	3.0	1	ND	Tasteless	No odor Little	Clear	ND	24	0
R 2 02	20 Juli 12	Tringfuerinuit	iviairiaigu	Contra	o doi bailipui	23°07′13.68″N	91°49′16.30″E	Akter Hossain	3(15)	19.8	STW	5.9	66	227	25.1	ND	ND	0.3	0.2	ND	ND	iron	amonia	Clear	ND	50	0
K-2-03 K-2-04	28-Jan-12 28-Jan-12	Khagrachhari Khagrachhari	Matiranga Matiranga	Gomti Gomti	Uttor Santipur Uttor Santipur	23°07′13.17″N	91°49′20.13″E	Abdul Hakım	2(10)	18.3	STW	5.7	62	274	25.3	ND	ND	ND	ND	ND	ND	Tasteless	Little iron Slightly	Clear	Little Slightly	21	0
K 2 05	28 Jap 12	Khagrachhari	Matiranga	Comti	Littor Sontinur	23°07′18.08″N	91°49′18.42″E	Abdul Hakim	2(10)	16	STW	6.0	73	207	23.8	ND	ND	0.3	0.7	ND	ND	Tasteless	amonia Slightly	Clear	turbid	118	20
K-2-03	20-Jaii-12	Kilagi aciillati	watiraliga	Golini	Ouor Sanupur	23°07′29.21″N	91°49′36.02″E	Kala Mia	5(25)	36.5	STW	5.4	43	239	25.0	ND	ND	0.1	0.6	ND	ND	Tasteless	iron	Clear	ND	52	0
K-2-06	28-Jan-12	Khagrachhari	Matiranga	Gomti	Uttor Santipur	23°07′26.39″N	91°49′33.47″E	Md. Harun	5(25)	16	STW	5.5	48	248	25.6	1.0	ND	0.1	0.1	0.2	ND	Little iron	No odor	Clear	ND	1	0
K-2-07	28-Jan-12	Khagrachhari	Matiranga	Gomti	Uttor Santipur	23°07′24.04″N	91°49′28.03″E	Amanullah	12(60)	22.8	STW	5.7	47	312	24.8	ND	ND	0.1	ND	ND	ND	Tasteless	No odor	Clear	ND	52	78
K-2-08 K-2-09	28-Jan-12 28-Jan-12	Khagrachhari	Matiranga	Gomti	Uttor Santipur Uttor Santipur	23°07′18.24″N	91°49′30.64″E	Abdul Hakim Abdul Aziz	4(20)	16	STW	5.7	37	318	24.7	0.5 ND	ND ND	0.1	ND ND	ND	ND	Tasteless	No odor No odor	Clear	ND	-	0
K-3-01	29-Jan-12	Khagrachhari	Sadar	Perachara	BARI	23°08'25 97"N	92°00′02 95″E	BARI (irrigation)	NA	_	River	72	104	173	19.0	ND	ND	03	0.2	ND	Not tested	Not tested	Little Amonia	Clear	Little turbid	84	0
K-3-02	29-Jan-12	Khagrachhari	Sadar	Perachara	BARI	Netteler	Net talaa	(Infgation)	20/100	122	CTW	7.2	40	100	10.0	ND	ND	0.5	ND	ND	Not	Testelese	Nesder	Clean	No	50	0
K-4-01	30-Jan-12	Khagrachhari		Pourashava	LGED Office			DAKI	20(100)	122	51 W	7.9	40	100	19.0	ND	ND	0.5	ND	ND	lested	Tasteless	Slightly	Clear	turbidity	50	0
K-4-02	30-Jan-12	Khagrachhari		Pourashava	Police line	23°07′04.98″N	91°58′24.11″E	LGED	10(50)	30.5	STW	5.9	161	96	24.4	ND	ND	1	14	0.5	ND	Tasteless	iron	Clear	ND Little	84	0
K-4-03	30-Jan-12	Khagrachhari		Pourashava	Police line	23°07′14.65″N	91°59′44.58″E	-	10(250)	-	nul	7.9	158	210	21.0	ND	ND	0.2	ND	ND	ND	Tasteless Slightly	No odor Slightly	Clear	turbid	56	0
K 4 04	20 Jan 12	Vho or och hori		Dougoahaya	Donnochovo vyoton	23°07′14.65″N	91°59′44.58″E	-	10(250)	-	STW	6.6	149	54	24.3	ND	ND	0.7	12	ND	ND	iron	iron	Clear	ND	63	0
K-4-04	50-Jan-12	Kilagi aciillati		Fourasitava	supply unit 1	23°06′44.07″N	91°59′30.61″E	-	N/A	46	STW	6.3	115	312	25.3	4	ND	ND	ND	ND	ND	Tasteless	No odor	Clear	ND	89	61
K-4-05	30-Jan-12	Khagrachhari		Pourashava	Pourashava water supply unit 2	23°06′08.21″N	91°58′57.39″E	_	N/A	85	STW	6.8	160	6	24.8	ND	ND	0.7	9	ND	ND	Not tested	Slightly iron	Clear	ND	2	0
K-4-06	30-Jan-12	Khagrachhari		Pourashava	Pourashava water supply unit 2	23°06′08.21″N	91°58′57.39″E	_	N/A	85	PWSS	7.5	152	189	23.0	0.1	ND	ND	ND	ND	Not tested	Tasteless	No odor	Clear	Little	72	150
K-6-01	31-Jan-12	Khagrachhari		Pourashava	Khagrapur	22°07/12 24//N	01°50/22 29″E	Zabarang	5(20)	24	STW	6.1	112	40	24.2	ND	ND	0.5	7	ND	ND	Little	Little	Clear	ND	0	0
K-6-02	31-Jan-12	Khagrachhari		Pourashava	Khagrapur	25 07 15.24 N	91 59 55.58 E	Multi Purpose	5(20)	24	51 W	0.1	115	49	24.2	ND	ND	0.5	/	ND	ND	non	amonia	Cical	ND	0	0
						23°07′30.74″N	91°59′30.82″E	Community Centre	4(30)	24	STW	5.9	50	212	25.2	ND	ND	0.1	0.6	ND	ND	Tasteless	Little iron	Clear	ND	0	0
K-6-03	31-Jan-12	Khagrachhari		Pourashava	Parjaton Ghat	23°06/12 63″N	01°58'08 06"F	Chingri Piyer	N/T		Diver	78	176	213	22.1	ND	ND	0.6	0.1	0.5	N/T	Tastalass	No odor	Brownish	Mild	0	0
R-1-01	2-Feb-12	Rangamati		Pourashava	Giri Shova	25 00 12.05 N	91 58 08.00 E	Giri Shova	11/1	_	River	7.0	170	215	22.1	ND	ND	0.0	0.1	0.5	11/1	Tasteless	No odol	green	wind	0	0
						22°38′51.55″N	92°11′14.20″E	Floating Restaurant	NA	_	Lake	7.5	106	225	21.3	0.5	ND	0.1	ND	ND	Not tested	Not tested	No odor	Clear	ND	87	124
R-1-02	2-Feb-12	Rangamati		Pourashava	Asam Bosti (Narikel Farm)	22°38′16 62″N	92°10′42 61″F	Nurul Alam	3(15)	20	STW	59	121	204	24.4	10	ND	0.4	0.4	ND	ND	Tasteless	Little	Clear	ND	43	0
R-1-03	2-Feb-12	Rangamati		Pourashava	Monoghor	22 23 10.02 11	02000/42 (2017)	Bidya Dhan	5(15)	20	DW		150	207	21.7	10		0.1	V.T		ND	Test 1	N ₁ 1	Clu	NID		100
R-1-04	2-Feb-12	Rangamati		Pourashava	DPHE	22°38'34.81"N	92°09'42.62"E	DPHE water	5(25)	20	Dw	5.3	152	289	26.5	45	ND	0.1	ND	ND	ND	Tasteless	No odor	Clear	ND	50	180
						22°39′30 319″N	92°10′30 670″E	treatment plant	_	_	PWSS	74	116	242	26.4	07	ND	0.1	0.2	ND	Not tested	Tasteless	No odor	Clear	ND	57	287
R-1-05	2-Feb-12	Rangamati		Pourashava	DPHE	22 37 30.317 11	92 10 50.010 E	DPHE water			1 11 55	7.1	110	212	20.4	0.7	n.b	0.1	0.2	THE .	tested	Tusteress	110 0001	Cicui		51	207
						22°39′30.974″N	92°10′31.001″E	plant	_	_	PWSS	7.4	111	236	22.5	0.4	ND	0.7	ND	ND	Not tested	Tasteless	No odor	Clear	Little turbid	64	109
R-2-01	4-Feb-12	Rangamati	Sadar	Bandukvanga	Sagu Para	22°44′20.40″N	92°10′34.32″E	Community Nore Bijoy	23(120)	-	Spring	6.3	93	241	21.4	ND	ND	0.2	ND	ND	ND	Tasteless	No odor	Clear	ND	137	12
R-2-02	4-FCD-12	Rangaman	Sauar	Bandukvanga	Sagu r'al'a	22°44′22.51″N	92°10′33.19″E	Chakma	3(15)	data	STW	6.6	105	137	24.9	1.5	ND	0.3	0.7	ND	ND	iron	Little iron	Clear	ND	0	0
R-2-03	4-Feb-12	Rangamati	Sadar	Bandukvanga	Mogh Para	22°44′03.27″N	92°10′44.63″E	Bala Ram Chakma	10(50)	_	Spring	6.3	107	268	21.8	ND	ND	0.2	ND	ND	ND	Tasteless	No odor	Clear	ND	199	0
R-2-04	4-Feb-12	Rangamati	Sadar	Bandukvanga	Mogh Para	22°44′10 37″N	92°10′58 48″E	Bharat Kumar Chakma	15(75)	_	Spring	6.3	186	282	22.9	0.5	ND	0.1	ND	ND	ND	Tasteless	No odor	Clear	ND	92	0
R-2-05	4-Feb-12	Rangamati	Sadar	Bandukvanga	Mogh Para	22°44'10 37"N	92°10′58 48″F	Bharat Kumar Chakma	15(75)	_	Spring	63	230	265	20.8	0.5	ND	0.1	ND	ND	ND	Not	Little	Clear	ND	119	107
R-2-06	4-Feb-12	Rangamati	Sadar	Bandukvanga	Mogh Para	22 1110.57 11	02010/50.00//5	Gyana Jyoti	5(05)	_	o .	5.5	250	200	20.0	0.0		0.1			Not	T	Little	Cicui	ND	110	107
R-2-07	4-Feb-12	Rangamati	Sadar	Bandukvanga	Kuki Para	22°44′07.33″N	92°10'50.82″E	Chakma Gyana Jyoti	5(25)	-	Spring	5.8	61	275	22.7	ND	ND	0.3	ND	ND	tested Not	Tasteless	Amonia Little	Clear	ND	106	98
R-2-08	4-Feb-12	Rangamati	Sadar	Bandukvanga	Kuki Para	22°44′29.21″N	92°10′27.12″E	Chakma Provat	5(25)	-	Spring	6.1	82	289	22.6	ND	ND	0.2	0.1	ND	tested	Tasteless	Amonia	Clear	ND	49	15
						22°44′26.32″N	92°10′26.40″E	Chandra Chakma	3(15)	21	STW	6.4	138	15	26.1	ND	ND	0.9	20	ND	ND	Iron	Iron	Clear	ND	6	0
									-																		
		Location Data									water source																
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											Туре									water (Juanty						
ID	Date	District	Upazila	Union	Village	Latitude	Longitude	House Owner	Number of HH (person)	well depth	of water source	рН	EC (µS/cm)	ORP	water temp. (°C)	NO ₃ (mg/L)	NO ₂ (mg/L)	NH4 (mg/L)	Fe (mg/L)	Mn (mg/L)	As (mg/L)	taste	odor	color	turbidity	General Bacteria	Colif. Bacteria
R-2-09	4-Feb-12	Rangamati	Sadar	Bandukvanga	Sagu Para	22°44′19.43″N	92°10′27.97″E	Community	3(15)	_	Lake	7.4	107	169	24.4	ND	ND	0.6	ND	ND	Not tested	Not tested	Little Amonia	Little greenish	Little turbidity	21	120
R-2-10	4-Feb-12	Rangamati	Sadar	Bandukvanga	Sagu Para	22°44′11.32″N	92°10′25.40″E	Boat landing	N/A	_	Lake	7.9	97	229	22.7	ND	ND	0.2	ND	ND	Not tested	Not tested	No odor	Clear	ND	0	1
R-2-11	4-Feb-12	Rangamati	Sadar	Bandukvanga	Sagu Para	22°42′00.82″N	92°10′32.05″E	Middle point of lake	N/A	_	Lake	7.9	97	239	23.8	ND	ND	0.2	ND	ND	Not tested	Not tested	No odor	Clear	ND	5	0
R-2-12	4-Feb-12	Rangamati	Sadar	Pourashava	Cultural Academy	22°30'36 60"N	02°10/13 02″E	Community	N/A		Laka	7.2	103	265	23.4	15	ND	0.6	ND	ND	Not	Not	No odor	Clear	ND	87	87
R-3-01	5-Feb-12	Rangamati	Kaptai	1 no	Barogonia	22 39 30.09 IN	92 10 13.92 E	Priyadarshi	5(20)	-	DW	1.2	200	205	23.4	1.5	ND	0.0	ND OC	ND	ND	Little	No odor	Clear	Little	02	07
R-3-02	5-Feb-12	Rangamati	Kaptai	1 no Chandraghona	Barogonia Tonchangya Para	22°30 34.55 N	92°0721.22 E	Provat	5(50)	12.2	Dw	0.8	300	8/	24.0	0.2	ND	0.75	0.6	ND	ND	Little		Clear	very little	9	0
R-3-03	5-Feb-12	Rangamati	Kaptai	1 no	Barogonia	22°30′35.01″N	92°07′20.12″E	Rosomoy	5(30)	61	STW	7.7	510	103	25.6	ND	ND	1.5	I	ND	ND Not	iron	Little iron	Clear	Little	0	0
R-3-04	5-Feb-12	Rangamati	Kaptai	Chandraghona 1 no	Tonchangya Para Barogonia	22°30′42.34″N	92°07′19.75″E	Tonchangya	6(35)	-	Spring	6.7	200	210	21.2	ND	ND	0.2	ND	ND	tested	Tasteless	No odor	Clear	turbidity Very	82	138
P 3 05	5 Eab 12	Pangamati	Kantai	Chandraghona	Tonchangya Para	22°30′08.95″N	92°07′31.62″E	Diptimoy Tonchangya	3(15)	61	STW	8.7	750	4	25.4	ND	ND	1	0.1	ND	ND	Tasteless	Amonia	Clear	little turbidity	42	39
R-3-05	5 E-h 12	Densemuti	Kaptai	Chandraghona	Tonchangya Para	22°30′09.49″N	92°07′34.42″E	Tonchangya	5(25)	12.2	DW	6.8	570	50	25.9	ND	ND	0.3	0.8	ND	ND	Tasteless	No odor	Clear	ND	16	153
K-3-06	5-Feb-12	Kangamati	Kaptai	1 no Chandraghona	Barogonia Tonchangya Para	22°30′15.66″N	92°07′33.82″E	Tonchangya	3(15)	12.2	Spring	6.8	166	193	20.9	ND	ND	ND	ND	ND	tested	Tasteless	No odor	Clear	ND	103	180
R-3-07	5-Feb-12	Rangamati	Kaptai	1 no Chandraghona	Barogonia Tonchangya Para	22°30′18.24″N	92°07′31.12″E	Mia Prue Tonchangya	5(25)	60	STW	8.0	370	25	25.1	ND	ND	0.2	0.1	ND	ND	Tasteless	Little amonia	Clear	Very little turbidity	25	0
R-3-08	5-Feb-12	Rangamati	Kaptai	1 no Chandraghona	Barogonia Tonchangya Para	22°30′19.21″N	92°07′30.85″E	Doya Ram Tonchangya	6(30)	13	DW	6.8	250	113	24.2	ND	ND	0.2	0.2	ND	ND	Tasteless	No odor	Clear	ND	36	180
R-4-01	7-Feb-12	Rangamati	Kaptai	Raikhali	Ferry Ghat (Karnafully River																Net	Net					
					Kaptai dam)	22°27′57.61″N	92°07′48.25″E	N/A	N/A	-	River	8.2	117	254	23.9	ND	ND	0.1	ND	ND	tested	tested	No odor	Clear	ND	11	210
B-1-01	8-Feb-12	Bandarban	Sadar	Pourasahva	Rajbari Pond	22°11′51.25″N	92°13′14.97″E	Community	100(1000)	-	Pond	9.1	460	184	25.5	ND	ND	0.3	0.1	ND	Not tested	Not tested	Little Amonia	Not clear	High turbidity	101	395
B-1-02	8-Feb-12	Bandarban	Sadar	Sadar	Senior Para	22°09'50.50″ N	92°10'57.93"E	Community	100(1000)	_	River	7.9	260	268	25.4	ND	ND	0.1	0.1	ND	Not tested	Tasteless	No odor	Clear	ND	50	260
B-1-03 B-2-01	8-Feb-12 9-Feb-12	Bandarban Bandarban	Sadar Sadar	Sadar Sadar	Senior Para Kattoli Para (Thei	22°11′51.25″N	92°13′14.97″E	Community	100(1000)	-	Spring	-	-	-	-	-	-	-	-	-	– Not	-	-	-	-	10	94
P 2 02	0 Eab 12	Bandarban	Sadar	Sadar	Prue)	22°15′52.01″N	92°15′13.89″E	Community	N/A	-	Spring	7.7	79	197	19.5	ND	ND	0.2	0.1	ND	tested	Tasteless	No odor	Clear	ND	51	88
B-2-02 B-2-03	9-Feb-12	Bandarban	Sadar	Sadar	(Kanergri) Kattoli Para (Loktoi	22°15′45.44″N	92°15′17.68″E	Community	N/A	-	Spring	7.9	79	230	24.0	ND	0.02	0.2	0.3	ND	tested Not	tested Not	No odor	Clear	ND	18	72
B-2-04	9-Feb-12	Bandarban	Sadar	Sadar	Mro) Kattoli Para (Sa	22°15′35.34″N	92°15′27.90″E	Community	N/A	-	Spring	7.0	48	254	18.3	ND	ND	0.1	ND	ND	tested Not	tested Not	No odor	Clear	ND	29	46
B-2-05	9-Feb-12	Bandarban	Sadar	Sadar	Prue Jhiri) Kattoli Para (Paing	22°15′11.47″N	92°15′02.79″E	Community	N/A	-	Spring	7.7	145	216	21.5	ND	ND	0.1	0.1	ND	tested Not	tested Not	No odor	Clear	ND	23	175
B-3-01	10-Feb-12	Bandarban	Sadar	Pourashava	Chara) Uiania Para	22°15′11.47″N	92°15′02.79″E	Community	N/A	-	Lake	7.9	139	209	21.8	ND	ND	0.2	0.1	ND	tested	tested	No odor Little	Clear	ND	99	310
B 3 02	10 Feb 12	Bandarban	Sadar	Dourschava	Kywching Ghata	22°11′53.49″N	92°13′08.10″E	Hotel Royal	3(60)	55	STW	5.8	380	125	25.3	ND	ND	0.2	5	2	ND Not	Tasteless	amonia	Clear	ND	40	0
D-3-02	10 E-1 12	Dandartar	Sadar	Dourach	New Culcher	22°11′00.17″N	92°13′50.67″E	Community	N/A	0	River	8.2	260	178	23.3	ND	ND	0.1	ND	ND	tested	tested	No odor	Clear	ND	40	38
Б-3-03	10-reb-12	Danuarban	Sauar	Pourasnava	New Guisnan	22°11′14.21″N	92°13′41.57″E	supply	2400	0	PWSS	8.0	270	227	22.7	ND	ND	0.1	0.1	ND	tested	Tasteless	No odor	Clear	ND	113	105
B-3-04	10-Feb-12	Bandarban	Sadar	Pourashava	Kalaghata			Md Kamal Hossain													Not	Not					
B-3-05	10-Feb-12	Bandarban	Sadar	Sadar	Lemu Jhiri	22°11′35.07″N 22°12′51.62″N	92°13′51.66″E 92°13′04.04″E	(Community) Community	15(75) 50(250)	5 27	DW STW	6.3 7.9	280 300	341 136	24.6 26.2	60 ND	0.04 ND	0.1	ND ND	ND ND	tested ND	tested Tasteless	No odor No odor	Clear Clear	ND ND	52 0	89 0
B-3-06	10-Feb-12	Bandarban	Sadar	Pourashava	Ukhyang Jhiri	22°12′22 19″N	92°13′01 70″E	Community	10(50)	0	Spring	66	200	258	23.1	ND	ND	0.1	ND	ND	Not tested	Tasteless	No odor	Clear	ND	16	16
B-3-07	10-Feb-12	Bandarban	Sadar	Pourashava	Ukhyang Jhiri	22°12'22 62"N	92°13′00.00″E	Sushil Bikash	2(12)	5	DW	6.8	220	253	23.2	0.3	ND	0.1	0.05	ND	Not	Not	Little Iron	Clear	ND	25	254
B-4-01	11-Feb-12	Bandarban	Sadar	Swalock	Moddhyam Para	22 12 22.02 N	92 13 00.09 E	Tonchangya	2(12)	5	Dw	0.8	220	233	23.2	0.3	ND	0.1	0.03	ND	Not	Not		Cieai	Very little	23	234
B-4-02	11-Feb-12	Bandarban	Sadar	Swalock	Ranglai Headman	22°05′05.80″N	92°15′09.42″E	Community	N/A	-	Spring	8.4	270	254	21.4	ND	ND	ND	ND	ND	tested Not	tested Not	No odor	Clear	turbidity	91	105
B-4-03	11-Feb-12	Bandarban	Sadar	Swalock	Para Sing Song Para	22°05′01.68″N	92°15′14.89″E	Community	NA	-	Spring	7.7	135	46	19.0	ND	ND	0.5	0.3	ND	tested Not	tested Not	Little iron	Clear	ND	29	87
B-4.04	11_Eab 12	Bandarban	Sadar	Swalock	Ranglai Headman	22°05′10.71″N	92°15′03.59″E	Community	NA	_	Spring	7.9	153	228	22.8	ND	ND	0.1	ND	ND	tested	tested	No odor	Clear	ND	10	157
B-4.05	11-100-12 11-Fab 12	Bandarban	Sadar	Swalock	Para Sing Song Para	22°05′10.80″N	92°15′02.45″E	Community	NA	-	Spring	8.2	186	236	20.9	ND	ND	ND	ND	ND	tested	Tasteless	No odor	Clear	ND	43	149
D-4-03	11-1.60-12	Banuarban	Saudi	SwallCK	Sing Song Fara						(source B-04-										Not	Not					
						22°05′09.03″N	92°14′58.81″E	Community	15(90)	-	03)	8.2	155	226	26.7	ND	ND	0.1	ND	ND	tested	tested	No odor	Clear	ND	56	228

		Location Data water source																		water	quality						
									Number		Type of				water						1						
ID	Date	District	Upazila	Union	Village	Latitude	Longitude	House Owner	of HH (person)	well depth	water source	pН	EC (µS/cm)	ORP	temp. (°C)	NO ₃ (mg/L)	NO ₂ (mg/L)	NH ₄ (mg/L)	Fe (mg/L)	Mn (mg/L)	As (mg/L)	taste	odor	color	turbidity	General Bacteria	Colif. Bacteria
B-4-06	11-Feb-12	Bandarban	Sadar	Swalock	Moddhyam Para						GFS																
						22005/12 72//N	02014/59 (5//15	Generalite	10(60)		B-04-	0.1	260	210	21.0	ND	ND	0.1	ND	ND	Not	Not	Needer	Class	ND	72	147
B-4-07	11-Feb-12	Bandarban	Sadar	Swalock	Ranglai Head Man	22°05°13.73°N	92°14'58.65" E	Community	10(60)	-	GFS	8.1	200	219	21.0	ND	ND	0.1	ND	ND	tested	tested	No odor	Clear	ND	/3	147
					Para						(source B-04-																
						22°05′18 90″N	92°14′53 03″E	Community	15(90)	_	02), direct	77	136	369	32.1	1	ND	0.1	ND	ND	Not tested	Not tested	No odor	Clear	ND	29	104
B-4-08	11-Feb-12	Bandarban	Sadar	Swalock	Sing Song Para	22 05 10.50 1	72 1433.03 E	Community	15(50)		GFS	7.7	150	507	52.1		ND	0.1	nD	TLD	tested	tested	100000	Cicai	ND	2)	104
											(source B-04-																
						22°05′18.90″N	92°14′53.03″E	Community	15(90)	-	02), Tap 01	7.9	137	253	20.1	ND	ND	0.1	ND	ND	Not tested	Not tested	No odor	Clear	ND	5	99
B-4-09	11-Feb-12	Bandarban	Sadar	Swalock	Sing Song Para						GFS (source																
											B-04-										Not	Not					
						22°05′19.64″N	92°14′49.27″E	Community	20(120)	-	02), Tap 02	7.9	138	256	20.9	ND	ND	0.1	ND	ND	tested	tested	No odor	Clear	ND	169	56
C-1-01	13-Feb-12	Cox's Bazar	Sadar	Ghilenga	Chander Para	21°26'07 89"N	92°01′04 40″E	Community	N/A	_	River	87	330	221	21.8	ND	ND	0.1	ND	ND	Not tested	Not tested	No odor	Clear	ND	8	249
C-1-02	13-Feb-12	Cox's Bazar	Sadar	Ghilenga	Chander Para			Community				5.7	1.1%	200	21.0	0.5	0.00	0.5	0.1		Not	Not		Citota Citota	110	170	140
C-1-03	13-Feb-12	Cox's Bazar	Sadar	Ghilenga	Chander Para	21°26′07.89″N	92°01′04.40″E	Community	N/A	-	River	7.8	(+)	209	22.6	0.5	0.09	0.5	0.1	ND	tested	tested	Little iron	Clear	ND	178	148
C-1-04	13-Feb-12	Cox's Bazar	Ramu	Fatay Khar	Tessyapul	21°20°10.77°1N	92°01'05.53°E	Community	IN/A	12	51W	7.0	800	112	25.5	ND	ND	0.35	15	0.25	ND	Iron	& amonia	Clear	ND	55	0
C-1-05	13-Feb-12	Cox's Bazar	Ramu	Kul Fatay Khar	Tessyapul	21°25′36.93″N	92°05′07.65″E	Madrassa	1(50)	36.5	STW	7.2	250	49	25.7	ND	ND	0.3	2	ND	ND	Tasteless	Little iron	Clear	ND	0	0
C-1-05	15-100-12	COX S Dazar	Rama	Kul	ressyapui	21°25′36.74″N	92°05′09.17″E	Madrassa	1(70)	91	DW	7.3	260	71	26.0	ND	ND	0.2	1.2	ND	ND	Tasteless	amonia	Clear	ND	23	0
C-2-01	14-Feb-12	Cox's Bazar	Ukhiya	Raja Palong	Kutupalong Pacchim Para	21°13′23.59″N	92°02′33.60″E	Shourav Sharma	10(50)	43	STW	6.1	101	116	25.7	ND	ND	0.2	10	ND	ND	Little iron	Little iron	Clear	ND	30	0
C-2-02	14-Feb-12	Cox's Bazar	Ukhiya	Raja Palong	Kutupalong	21912/22 99//N	02800/22 00//E	Suvodon	10(50)	22	CTW	()	1.00	7	25.7	ND	ND	0.2	0	NID	ND	Little	T :::1: ::::::	Class	ND	27	0
C-2-03	14-Feb-12	Cox's Bazar	Ukhiya	Raja Palong	Kutupalong	21 13 22.88 N	92 09 33.99 E	Suvodon	10(30)	33	51W	0.5	100	/	23.1	ND	ND	0.5	9	ND	Not	Not	Little Iron	Clear	Little	21	0
C-2-04	14-Feb-12	Cox's Bazar	Ukhiya	Raja Palong	Kutupalong	21°13′19.30″N	92°09′34.31″E	Sharma Fakir Chandra	5(50)	-	Pond	7.0	65	247	21.3	ND	ND	0.1	ND	ND	tested	tested Little	No odor Little iron	Not clear	turbidity	70	107
				Tuju Tulong	The second secon	21°13′19.97″N	92°09′37.41″E	Shil	4(20)	51.8	STW	6.3	166	12	25.0	ND	ND	0.3	10	ND	ND	iron	& amonia	Clear	ND	50	140
C-2-05	14-Feb-12	Cox's Bazar	Ukhiya	Raja Palong	Kutupalong (Swarnopahar Purbo			Gondung													Not	Not			Little		
C 2.08	14 Eab 12	Con's Dogor	Libbino	Holodia	Para)	21°13′13.78″N	92°09′59.49″E	Khal	N/A	-	River	7.0	70	261	23.5	ND	ND	0.1	ND	ND	tested	tested	No odor	Not clear	turbidity	76	122
C-2-08	14-reb-12	COX S Bazar	Ukiliya	Palong	Gura Mia Garage	21°17′53.90″N	92°05′50.74″E	Community	10	15	STW	7.8	520	340	25.6	1	ND	0.1	0.5	ND	ND	Tasteless	No odor	Clear	ND	1	0
C-2-09	14-Feb-12	Cox's Bazar	Ukhiya	Holodia Palong	Morissya	21°18′08.85″N	92°05′49.16″E	Zamir Hossain	2(10)	7	STW	5.4	139	329	23.8	0.2	ND	6	2	ND	ND	Tasteless	Little amonia	Clear	ND	14	0
C-2-10	14-Feb-12	Cox's Bazar	Ukhiya	Holodia	Purbo Patabari	21°18′17.00″N	02°08′54 80″E	Abul Kasam	2(15)	7	STW	5.0	129	70	25.0	ND	ND	0.5	19	ND	0.025	Not	Little iron	Clear	ND	12	0
C-3-01	15-Feb-12	Cox's Bazar	Teknaf	Bahar Chara	Mata Vanga	21 18 17.00 N	92 08 34.89 E	Abui Kaselli	3(13)	/	51W	5.9	138	70	25.0	ND	ND	0.5	10	ND	Not	Not	Little IIOII	Clear	ND	12	0
C-3-02	15-Feb-12	Cox's Bazar	Teknaf	Bahar Chara	Mata Vanga	20°59′06.56″N	92°12′10.48″E	Community	N/A	-	River	8.4	480	242	20.8	ND	ND	0.05	ND	ND	Not	tested	No odor	Clear	ND	71	74
C-3-03	15-Feb-12	Cox's Bazar	Teknaf	Bahar Chara	Marish Baniya	20°58′56.77″N	92°12′03.43″E	Tajor Muluk	4(20)	8.5	DW	7.0	580	259	25.5	ND	ND	0.1	ND	ND	tested Not	Tasteless	No odor	Clear	ND	52	174
C-3-03	15-100-12	COXSDaZai	TCKIIdi	Danai Citara	Marish Baniya	20°58′40.11″N	92°12′06.27″E	Kasim Majhi	10(50)	-	Spring	7.0	660	119	23.6	2	ND	0.1	0.2	0.5	tested	Tasteless	No odor	Clear	ND	24	0
C-3-04	15-Feb-12	Cox's Bazar	Teknaf	Bahar Chara	Marish Baniya	20°58′38.14″N	92°12′12.62″E	Nasir Uddin Chowdhury	3(15)	9	STW	7.2	580	157	26.1	5	0.01	0.05	ND	ND	ND	Not tested	No odor	Clear	ND	4	0
C-3-05	15-Feb-12	Cox's Bazar	Teknaf	Bahar Chara	Marish Baniya	20°58′33.52″N	92°12′10.51″E	Community	N/A	_	River	7.9	620	199	21.2	ND	ND	0.05	ND	ND	Not tested	Not tested	No odor	Clear	ND	44	2
C-3-06	15-Feb-12	Cox's Bazar	Teknaf	Bahar Chara	Marish Baniya	20°58′29.28″N	92°12′05.17″E	Md. Idris	5(25)	_	Spring	7.7	1350	42	21.7	ND	ND	0.05	ND	ND	Not tested	Taste salt	No odor	Clear	ND	36	7
C-3-07	15-Feb-12	Cox's Bazar	Teknaf	Bahar Chara	Marish Baniya	20059/22 07/2	02012/07 00//5	Zinnet All	2(12)	10	DW	7.0	1000		27.4	0.7	ND	0.1		ND	ND	Little	Tiul.	Class	ND		
C-3-08	15-Feb-12	Cox's Bazar	Teknaf	Bahar Chara	Marish Baniya	20°58′23.87″N	92°12'07.99″E	Zinnat Ali	2(12)	12	DW	/.0	440	25	25.4	0.5	ND	0.1	5	ND	ND	Little	Little iron	Clear	ND	11	62
C-3-09	15.2.2012	Cox's Bazar	Cox's Bazar	· Paurshaba	Kalatali	20°58′25.43″N 21°25′10 92″N	92°12′12.60″E 91°58′57.07″E	Nur Hossain Uni Resort	2(10) 2(10)		Spring DTW	8.1 7.9	1450 650	60 60	27.5	ND ND	ND ND	0.4 ND	1.5 ND	2 ND	tested ND	iron Tastless	amonia No odder	Clear Clear	ND ND	9	0
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