CHAPTER 8   PUBLIC HEALTH AND HYGIENE IN TABORA REGION

8.1   GENERAL

This chapter describes public health and hygiene in Tabora Region in the context of rural water supply.   Morbidity is summarised in the next section to overview the characteristics of disease pattern in Tabora Region that has lower water supply coverage and lower utilisation of protected water sources.   Subsequently, people's perception, knowledge and practice on public health and hygiene are analysed.

Health education, which is supposed to be done for health promotion both at community and at school, is a key to better health outcomes through behavioural change of people in conjunction with improvement of rural water supply.   Therefore, following identification of stakeholders of health promotion in Tabora Region, it is reviewed who is actually doing what for health promotion. Current situation of health service delivery, access to safe water and sanitation and government's policies and programmes are also observed to grasp the circumstances around people's health.

Taking consideration of the above-mentioned aspects, problem identification and some implications are summarised as a conclusion of the chapter for better planning and implementation of public health and hygiene in Tabora Region.

Data and relevant information were collected from the websites of Ministry of Water (MoW) and Ministry of Health and Social Welfare (MoHSW), Health Management Information System (HMIS) and District Health Information System (DHIS), and through the interview with District Water and Sanitation Team (DWST) and the socio-economic survey conducted by the JICA Study Team.

8.2   MORBIDITY IN TABORA REGION

Figure 8.2.1 and 8.2.2 compares disease pattern at outpatient department (OPD) level in Tabora Region with that in Tanzania Mainland.   Malaria is the most common disease for both age groups of the population aged under five (5) years and five (5) years and above: 52% of all cases for population aged under five (5) years and 39% for above five (5).   It is followed by acute respiratory infection (ARI) (15% for under five (5), 11% for five (5) and above), pneumonia (7%, 5%), diarrhoea (7%, 4%), eye infections (4%, 3%) and intestinal worms (3%, 5%).   The composition of top 10 OPD diseases in Tabora Region is the same as that of Tanzania Mainland.

Also in inpatient department (IPD), malaria, both severe complicated and uncomplicated, is the most common in Tabora Region: 66% of all IPD cases for population aged under five (5), 53% for above five (5) (Figure 8.2.3 and Figure 8.2.4).   It is followed by anaemia (8% for under five (5), 4% for five (5) and above), pneumonia (8%, 4%) and diarrhoea (6%, 5%).   The composition of major IPD diseases in Tabora Region is not much different from that of Tanzania Mainland.

According to the HMIS data collected by Tabora Regional Health Management Team (RHMT), no cholera cases were reported in 2006 and 2008.   As for the other water-borne diseases, 1,391 and 913 dysentery cases were reported in 2006 and 2008 respectively, while 696 and 454 typhoid cases were done in 2006 and 2008.   However, in comparison with the other regions, it cannot be said that Tabora is especially in the bad situation (Table 8.2.1).

Water Sector Performance Report for the FY 2007/08 says that Tabora Region is one of the least developed Regions in Tanzania in terms of coverage of water supply and utilisation of protected water sources.   However, based upon the OPD/IPD data, that does not automatically result in

more cases of water-borne diseases.   Therefore, it can be said that the health sector in Tabora Region need to address the common challenges to the others.
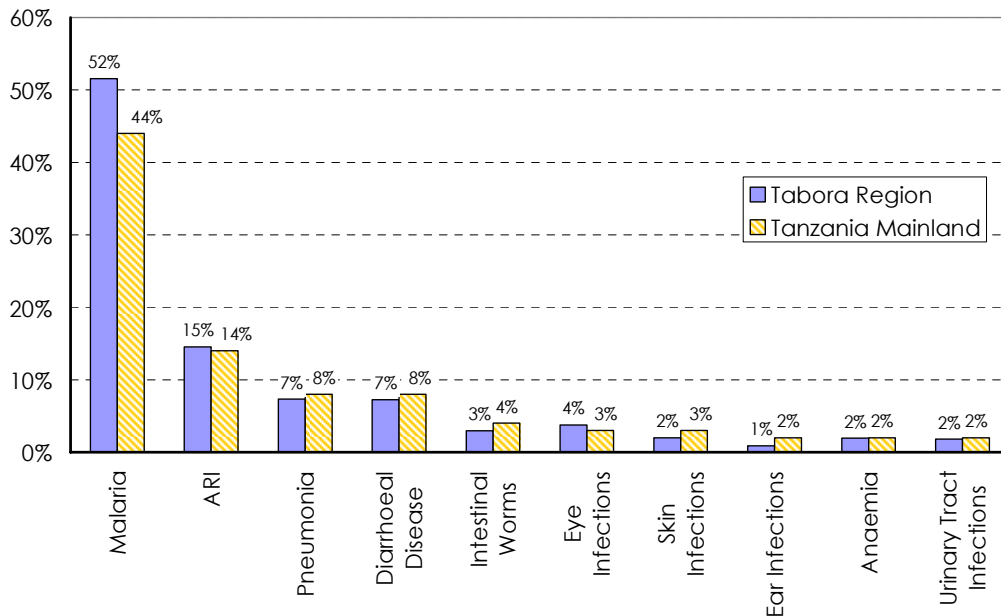
Note: Data of Tabora Region are as of the year 2008, while those of Tanzania Mainland are in 2006.
Source: (1) Tabora Region: HMIS data from Tabora Regional Health Management Team
            (2) Tanzania Mainland: Ministry of Health and Social Welfare (2008) *Tanzania Health Statistical Abstract, Tanzania Mainland 2008*, p33

Figure 8.2.1   Top 10 OPD Diseases for the Population under 5 Years of Age in Tabora Region and Tanzania Mainland
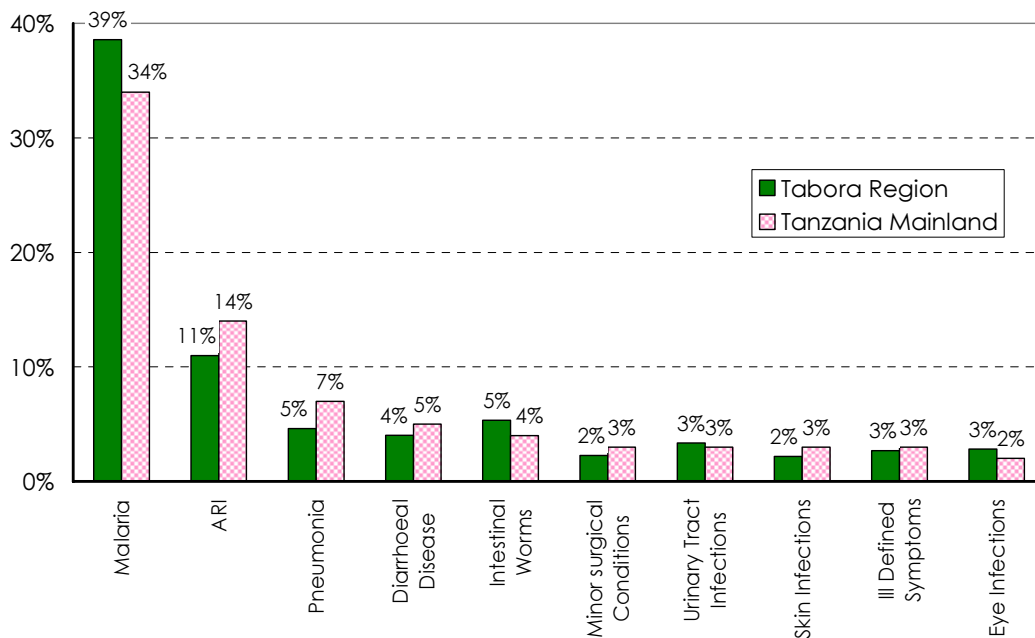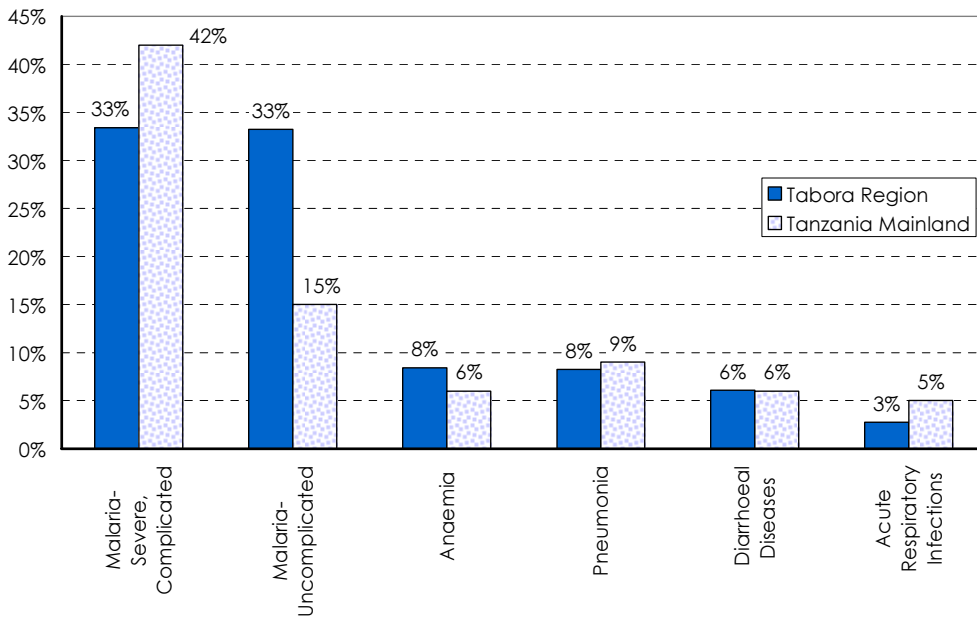

Note: Data of Tabora Region are as of the year 2008, while those of Tanzania Mainland are in 2006.
Source: (1) Tabora Region: HMIS data from Tabora Regional Health Management Team
            (2) Tanzania Mainland: Ministry of Health and Social Welfare (2008) *Tanzania Health Statistical Abstract, Tanzania Mainland 2008*, p34

Figure 8.2.2   Top 10 OPD Diseases for the Population Aged 5 Years and Above in Tabora Region and Tanzania Mainland

Note: Data of Tabora Region are as of the year 2008, while those of Tanzania Mainland are in 2006.
Source: (1) Tabora Region: HMIS data from Tabora Regional Health Management Team
           (2) Tanzania Mainland: Ministry of Health and Social Welfare (2008) *Tanzania Health Statistical Abstract, Tanzania Mainland 2008*, p35

Figure 8.2.3   Major IPD Diseases for the Population under 5 Years of Age in Tabora Region and Tanzania Mainland
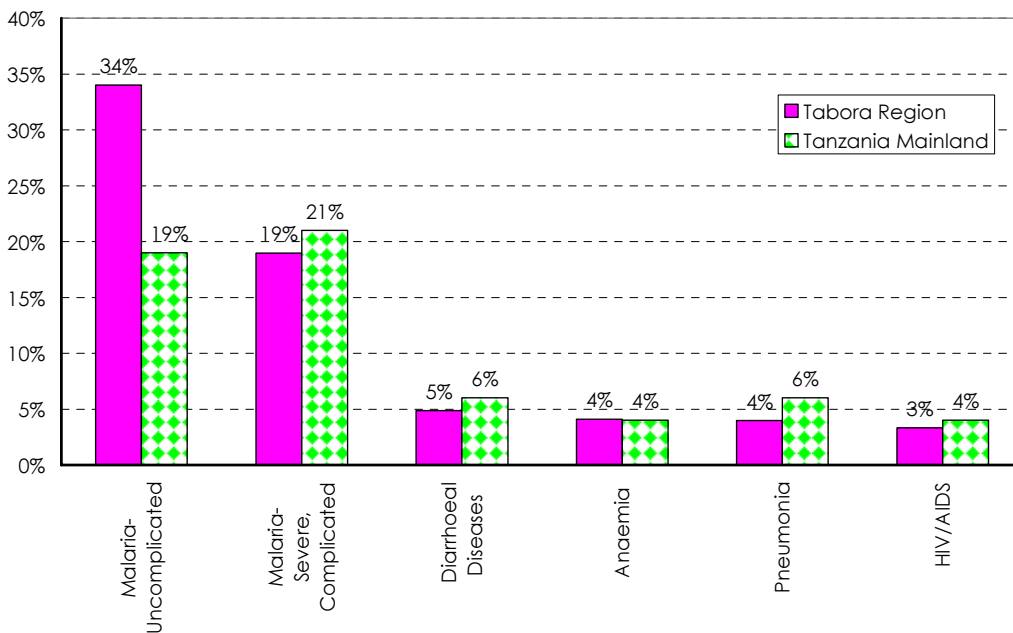

Note: Data of Tabora Region are as of the year 2008, while those of Tanzania Mainland are in 2006.
Source: (1) Tabora Region: HMIS data from Tabora Regional Health Management Team
           (2) Tanzania Mainland: Ministry of Health and Social Welfare (2008) *Tanzania Health Statistical Abstract, Tanzania Mainland 2008*, p35

Figure 8.2.4   Major IPD Diseases for the Population Aged 5 Years and Above in Tabora Region and Tanzania Mainland

Table 8.2.1   Reported Cases of Cholera, Dysentery and Typhoid (2006)

Region	Cholera		Dysentery		Typhoid	
	Cases	per 100,000	Cases	per 100,000	Cases	per 100,000
Arusha	100	6.7	1,354	90.9	67	4.5
Dar es Salaam	5,960	214.1	6,974	250.5	1,478	53.1
Dodoma	254	13.4	6,746	356.2	2,976	157.1
Iringa	1	0.1	4,199	251.6	568	34.0
Kagera	83	3.7	3,380	148.9	609	26.8
Kigoma	1,396	74.5	3,373	180.0	720	38.4
Kilimanjaro	9	0.6	293	19.0	134	8.7
Lindi	0	0.0	3,592	407.5	82	9.3
Manyara	45	3.9	2,985	257.0	731	62.9
Mara	0	0.0	926	60.7	96	6.3
Mbeya	353	15.3	4,480	194.0	1,351	58.5
Morogoro	324	16.5	1,967	100.2	58	3.0
Mtwara	0	0.0	1,052	83.6	0	0.0
Mwanza	0	0.0	2,932	89.4	641	19.5
Pwani (Coast)	780	78.7	6,354	641.5	353	35.6
Rukwa	611	48.0	2,402	188.9	1,352	106.3
Ruvuma	1,126	90.3	1,339	107.4	0	0.0
Shinyanga	0	0.0	6,034	192.8	950	30.4
Singida	0	0.0	2,210	181.7	134	11.0
Tabora	**0**	**0.0**	**1,391**	**72.7**	**696**	**36.4**
Tanga	424	23.2	5,964	325.6	895	48.9
Total	**11,466**	**30.6**	**69,947**	**186.5**	**13,891**	**37.0**

Source: Ministry of Health and Social Welfare (2008) *Tanzania Health Statistical Abstract, Tanzania Mainland 2008*, pp38-39

8.3   PERCEPTION, KNOWLEDGE AND PRACTICE OF PEOPLE ON HEALTH AND HYGIENE

People's health status is not emerged in the statistics until they utilise the health facility. Therefore, HMIS provides limited information on their health and actual morbidity may be different.

Utilisation of health facility is realised when people recognise their physical condition as sick, they have the knowledge to go to the facility to deal with their health problem and they actually take that action.

This section focuses on people's perception, knowledge and actual practice on health and hygiene. Firstly, based upon the results of the key informant interview conducted by JICA Study Team in 2009, the perception of key informants in village level such as VEO and Village Chairperson on common diseases is reviewed.   Subsequently with use of data collected through the socio-economic survey by JICA Study Team in 2010, it is analysed what diseases people utilise the health facility, and how they actually practice based upon what knowledge.   Taken diarrhoea as an example of water-borne diseases, knowledge on causes and ways of prevention of that disease and practice actually taken by people are investigated.

8.3.1   PERCEPTION OF KEY INFORMANTS ON HEALTH AND HYGIENE

Respondents for key informant interview indicated their perception that malaria is the most common disease in both rainy (94.0%) and dry seasons (85.7%) (Table 8.3.1 and 8.3.2). Diarrhoea is regarded as another common disease in rainy season (88.8%) followed by dysentery

(21.2%), typhoid fever (18.6%) and respiratory diseases like ARI and pneumonia (3.5%), while the informants consider there are more cases of respiratory diseases (53.9%) than diarrhoea (19.9%) and eye diseases (10.2%) in dry season.

Table 8.3.1   Perception of Key Informants on Common Diseases (Rainy Season)

Disease District/Municipality	n	Malaria	Diarrhoea	Dysentery	Typhoid	Respiratory	Others
Igunga	97	99.0%	87.6%	37.1%	4.1%	3.1%	3.1%
Nzega	152	86.8%	98.7%	18.4%	10.5%	0.0%	2.0%
Sikonge	53	100.0%	92.5%	9.4%	37.7%	5.7%	7.5%
Tabora Rural	109	95.4%	83.5%	25.7%	39.4%	2.8%	0.9%
Tabora Municipality	24	87.5%	83.3%	8.3%	45.8%	0.0%	4.2%
Urambo	112	96.4%	81.3%	15.2%	7.1%	8.9%	0.0%
Total	**547**	**94.0%**	**88.8%**	**21.2%**	**18.6%**	**3.5%**	**2.2%**

NB: Multiple answers are allowed.
Note: (1) "n" denotes the number of key informants.
             (2) Multiple answers are allowed.
Source: Results of key informant interview by JICA Study Team in 2009

Table 8.3.2   Perception of Key Informants on Common Diseases (Dry Season)

Disease District	n	Malaria	Respiratory	Diarrhoea	Eye Diseases	Scabies	Dysentery	Typhoid	Others
Igunga	97	90.7%	77.3%	27.8%	10.3%	2.1%	4.1%	1.0%	3.1%
Nzega	152	91.4%	36.8%	14.5%	6.6%	0.7%	3.9%	0.7%	1.3%
Sikonge	53	94.3%	67.9%	17.0%	17.0%	1.9%	1.9%	5.7%	5.7%
Tabora Rural	109	78.0%	49.5%	26.6%	5.5%	9.2%	5.5%	11.0%	1.8%
Tabora Municipality	24	66.7%	62.5%	12.5%	33.3%	4.2%	0.0%	8.3%	0.0%
Urambo	112	81.3%	52.7%	17.0%	11.6%	8.9%	3.6%	0.0%	1.8%
Total	**547**	**85.7%**	**53.9%**	**19.9%**	**10.2%**	**4.6%**	**3.8%**	**3.5%**	**2.2%**

NB: Multiple answers are allowed.
Note: (1) "n" denotes the number of key informants.
             (2) Multiple answers are allowed.
Source: Results of key informant interview by JICA Study Team in 2009

8.3.2 PERCEPTION, KNOWLEDGE AND PRACTICE OF PEOPLE ON HEALTH AND HYGIENE

For the socio-economic survey conducted by JICA Study Team, 300 households were randomly sampled from 20 villages selected for "the Priority Project" (15 households per village).   SPSS ver.14 was used for data analysis.

(1) Memorable Events of Diseases and Care Seeking Behaviour

200 out of 300 households (66.7%) responded that at least a family member experienced an event of disease for the last 12 months (Table 8.3.3).   They have 315 cases in total.   Malaria is the most common disease (134 cases, 42.5%), followed by non-communicable diseases (NCD) (87 cases, 27.6%) and diarrhoeal diseases (45 cases, 14.3%) (Table 8.3.4).   Malaria is the most common in Igunga, Sikonge and Urambo Districts and Tabora Municipality, while the respondents recognise more cases of non-communicable diseases in Nzega and Tabora Rural Districts.   There are many cases of diarrhoea in Nzega and Urambo Districts, accounting for more than 20%.

According to Table 8.3.5, the respondents utilised health facilities for 259 out of 313 cases (82.7%): 35 out of 45 diarrhoea cases (77.8%), 118 out of 134 malaria cases (88.1%) and 69 out of 87 NCD cases (79.3%).   That implies the respondents recognise malaria, NCD and diarrhoea as diseases handled by the health workers as far as they revealed the events of those diseases.

Table 8.3.3   Experience of Diseases for the Last 12 Months

District		Experience of Diseases		Total
		Yes	No	
Igunga	n	21	9	30
	%	70.0%	30.0%	100.0%
Nzega	n	49	11	60
	%	81.7%	18.3%	100.0%
Sikonge	n	19	26	45
	%	42.2%	57.8%	100.0%
Tabora Rural	n	21	24	45
	%	46.7%	53.3%	100.0%
Tabora Municipality	n	33	12	45
	%	73.3%	26.7%	100.0%
Urambo	n	57	18	75
	%	76.0%	24.0%	100.0%
Total	n	200	100	300
	%	66.7%	33.3%	100.0%

Note: Multiple answers are allowed.
Source: Results of Socio-economic Survey by JICA Study Team in 2010

Table 8.3.4   Memorable Events of Diseases in Households

District		Name of Diseases							Total
		Diarrhoea	Malaria	Other Communicabl.	Injury	NCD	Others	Don't know	
Igunga	n	0	13	3	0	6	7	0	29
	%	0.0%	44.8%	10.3%	0.0%	20.7%	24.1%	0.0%	100.0%
Nzega	n	12	13	1	2	30	0	0	58
	%	20.7%	22.4%	1.7%	3.4%	51.7%	0.0%	0.0%	100.0%
Sikonge	n	1	17	2	1	7	0	0	28
	%	3.6%	60.7%	7.1%	3.6%	25.0%	0.0%	0.0%	100.0%
Tabora Rural	n	3	13	1	0	14	1	0	32
	%	9.4%	40.6%	3.1%	0.0%	43.8%	3.1%	0.0%	100.0%
Tabora Municipality	n	4	28	1	1	10	1	1	46
	%	8.7%	60.9%	2.2%	2.2%	21.7%	2.2%	2.2%	100.0%
Urambo	n	25	50	19	2	20	5	1	122
	%	20.5%	41.0%	15.6%	1.6%	16.4%	4.1%	0.8%	100.0%
Total	n	45	134	27	6	87	14	2	315
	%	14.3%	42.5%	8.6%	1.9%	27.6%	4.4%	0.6%	100.0%

Note: Multiple answers are allowed.
Source: Results of Socio-economic Survey by JICA Study Team in 2010

Table 8.3.5   Care Seeking Behaviour by Respondents

Name of Diseases		Care Seeking Behaviour						Total
		Dispensary	Health Centre	Hospital	Pharmacy	Nowhere	Others	
Diarrhoea	n	16	8	11	6	3	1	45
	%	35.6%	17.8%	24.4%	13.3%	6.7%	2.2%	100.0%
Malaria	n	55	11	52	12	3	1	134
	%	41.0%	8.2%	38.8%	9.0%	2.2%	0.7%	100.0%
Other Communicable	n	10	1	9	5	2	0	27
	%	37.0%	3.7%	33.3%	18.5%	7.4%	0.0%	100.0%
Injury/Accident	n	2	0	2	1	0	1	6
	%	33.3%	0.0%	33.3%	16.7%	0.0%	16.7%	100.0%
NCD	n	22	5	42	7	4	7	87
	%	25.3%	5.7%	48.3%	8.0%	4.6%	8.0%	100.0%
Others	n	4	1	8	0	1	0	14
	%	28.6%	7.1%	57.1%	0.0%	7.1%	0.0%	100.0%
Total	n	109	26	124	31	13	10	313
	%	34.8%	8.3%	39.6%	9.9%	4.2%	3.2%	100.0%

Note: Multiple answers are allowed.
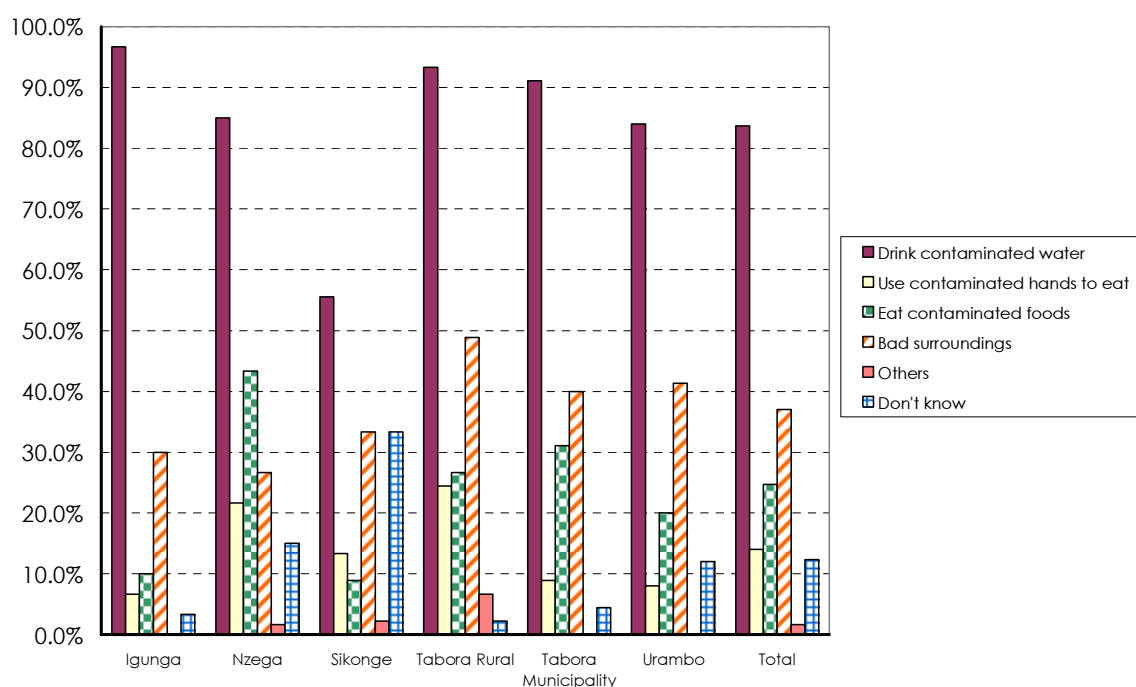Source: Results of Socio-economic Survey by JICA Study Team in 2010

(2)   Knowledge on Causes of Diarrhoea

Table 8.3.6 and Figure 8.3.1 shows the responses to the question, "What are the causes of diarrhoea?", and reveal statistically significant differences among districts.   More than 90% of the respondents know at least one cause of diarrhoea in Igunga and Tabora Rural Districts and Tabora Municipality.   On the other hand, 15 out of 45 respondents (33.3%) do not know at all in Sikonge District.

In all districts except Sikonge, more than 80% of the respondents regard "drinking contaminated water" as a cause of diarrhoea.   However, only 42 out of 300 respondents (14.0%) reply "using contaminated hands to eat" results in diarrhoea.   Also, few recognise "eating contaminated foods" and "bad surroundings" as causes of diarrhoea: only 74 (24.7%) and 111 respondents (37.0%) have correct answers respectively.

Table 8.3.6   Respondents' Knowledge on Causes of Diarrhoea

District	No of Respondents	Drink contaminated water		Use contaminated hands to eat		Eat contaminated foods		Bad surroundings		Others		Don't know	
		n	%	n	%	n	%	n	%	n	%	n	%
Igunga	30	29	96.7%	2	6.7%	3	10.0%	9	30.0%	0	0.0%	1	3.3%
Nzega	60	51	85.0%	13	21.7%	26	43.3%	16	26.7%	1	1.7%	9	15.0%
Sikonge	45	25	55.6%	6	13.3%	4	8.9%	15	33.3%	1	2.2%	15	33.3%
Tabora Rural	45	42	93.3%	11	24.4%	12	26.7%	22	48.9%	3	6.7%	1	2.2%
Tabora Municipality	45	41	91.1%	4	8.9%	14	31.1%	18	40.0%	0	0.0%	2	4.4%
Urambo	75	63	84.0%	6	8.0%	15	20.0%	31	41.3%	0	0.0%	9	12.0%
Total	**300**	**251**	**83.7%**	**42**	**14.0%**	**74**	**24.7%**	**111**	**37.0%**	**5**	**1.7%**	**37**	**12.3%**

Note: Multiple answers are allowed.
Source: Results of Socio-economic Survey by JICA Study Team in 2010

Figure 8.3.1   Respondents' Knowledge on Causes of Diarrhoea

Average number of right answers by the respondents is 1.61 out of 4 as full marks, and shows significant differences among districts (Table 8.3.7).   More than 70% of the respondents have two or more correct answers in Tabora Rural and Nzega Districts (73.3%) and Tabora Municipality. However, it is inferred from the result that people have limited knowledge on causes of diseases.

Table 8.3.7   Number of Correct Answers to Question on Causes of Diarrhoea

District		Number of Correct Answers					Average
		0	1	2	3	4	
Igunga	n	1	18	9	1	1	1.43
	%	3.3%	60.0%	30.0%	3.3%	3.3%	-
Nzega	n	9	7	32	12	0	1.78
	%	15.0%	11.7%	53.3%	20.0%	0.0%	-
Sikonge	n	15	13	13	4	0	1.13
	%	33.3%	28.9%	28.9%	8.9%	0.0%	-
Tabora Rural	n	1	11	21	11	1	2.00
	%	2.2%	24.4%	46.7%	24.4%	2.2%	-
Tabora Municipality	n	2	16	20	7	0	1.71
	%	4.4%	35.6%	44.4%	15.6%	0.0%	-
Urambo	n	9	25	33	8	0	1.53
	%	12.0%	33.3%	44.0%	10.7%	0.0%	-
Total	**n**	**37**	**90**	**128**	**43**	**2**	**1.61**
	%	**12.3%**	**30.0%**	**42.7%**	**14.3%**	**0.7%**	**-**

Source: Results of Socio-economic Survey by JICA Study Team in 2010

In addition, it can be said that the knowledge on causes of diarrhoea is positively correlated with education level of the head of households and spouses. The correlation coefficients are 0.208 for education of the head and 0.174 for that of the spouses. They are not high but statistically significant at 1 % level.

(3) Knowledge on Prevention of Diarrhoea

Table 8.3.8 and Figure 8.3.2 are the results of investigation on the respondents' knowledge on diarrhoea prevention and show statistically significant differences among districts.   Over 90% of the respondents have at least a tip of knowledge on diarrhoea prevention in Igunga and Tabora Rural Districts and Tabora Municipality.   On the contrary 16 out of 45 respondents (35.6%) do not know anything.

In four districts except Sikonge and Urambo, more than 80% of the respondents know "using safe water" is a way of diarrhoea prevention.   However, only 67 out of 300 respondents (22.3%) say "washing hands properly with use of running water and soap" can prevent diarrhoea.   In addition, there are few respondents that recognise "using proper latrine" and "refusing disposal in a pit properly" as methods of containing prevalence of diarrhoea: only 97 (32.3%) and 23 respondents (7.7%) have correct answers respectively.

Table 8.3.8   Respondents' Knowledge on Prevention of Diarrhoea

District	No of Respondents	Use safe water		Wash hands properly		Use proper latrine		Refuse disposal in a pit properly		Don't know	
		n	%	n	%	n	%	n	%	n	%
Igunga	30	29	96.7%	2	6.7%	6	20.0%	0	0.0%	1	3.3%
Nzega	60	48	80.0%	28	46.7%	25	41.7%	6	10.0%	11	18.3%
Sikonge	45	23	51.1%	4	8.9%	10	22.2%	2	4.4%	16	35.6%
Tabora Rural	45	39	86.7%	7	15.6%	18	40.0%	2	4.4%	1	2.2%
Tabora Municipality	45	39	86.7%	11	24.4%	13	28.9%	7	15.6%	2	4.4%
Urambo	75	56	74.7%	15	20.0%	25	33.3%	6	8.0%	14	18.7%
Total	**300**	**234**	**78.0%**	**67**	**22.3%**	**97**	**32.3%**	**23**	**7.7%**	**45**	**15.0%**

Note: Multiple answers are allowed.
Source: Results of Socio-economic Survey by JICA Study Team in 2010
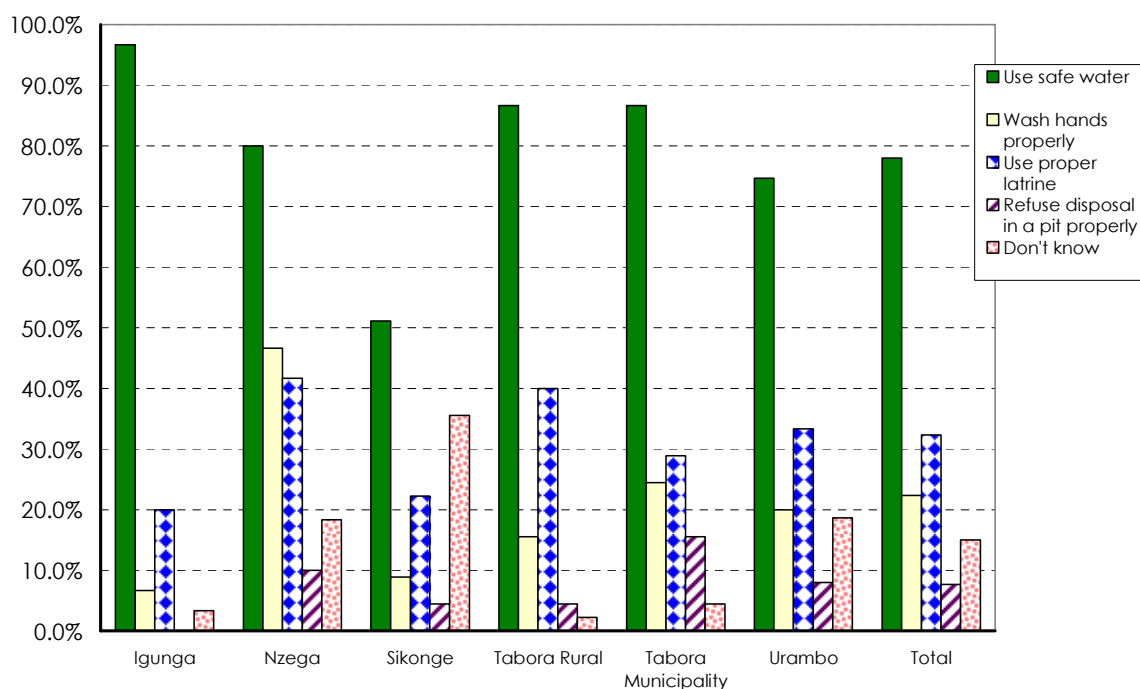
Note: Multiple answers are allowed.
Source: Results of Socio-economic Survey by JICA Study Team in 2010

Figure 8.3.2   Respondents' Knowledge on Prevention of Diarrhoea

Average number of right answers by the respondents is 1.77 out of 7 as full marks, and shows significant differences among districts (Table 8.3.9).   The averages of Nzega (2.27), Tabora Rural (1.87) and Urambo Districts (1.85) are above the regional one.   In Nzega District 70% of the respondents have two (2) or more correct answers, but 18.3% totally do not know how to prevent diarrhoea.   It is inferred from the result that people have limited knowledge on disease prevention.

Table 8.3.9   Number of Correct Answers to Question on Knowledge on Diarrhoea Prevention

District		Number of Correct Answers					Average
		0	1	2	3	4+	
Igunga	n	1	21	7	1	0	1.27
	%	3.3%	70.0%	23.3%	3.3%	0.0%	-
Nzega	n	11	7	12	20	10	2.27
	%	18.3%	11.7%	20.0%	33.3%	16.7%	-
Sikonge	n	16	11	11	6	1	1.22
	%	35.6%	24.4%	24.4%	13.3%	2.2%	-
Tabora Rural	n	1	14	20	10	0	1.87
	%	2.2%	31.1%	44.4%	22.2%	0.0%	-
Tabora Municipality	n	2	17	17	7	2	1.78
	%	4.4%	37.8%	37.8%	15.6%	4.4%	-
Urambo	n	14	14	24	15	8	1.85
	%	18.7%	18.7%	32.0%	20.0%	10.7%	-
Total	**n**	**45**	**84**	**91**	**59**	**21**	**1.77**
	%	**15.0%**	**28.0%**	**30.3%**	**19.7%**	**7.0%**	**-**

Source: Results of Socio-economic Survey by JICA Study Team in 2010

The knowledge on diarrhoea prevention is positively correlated with education level of the head of households and spouses. The correlation coefficients are 0.171 for education of the head and 0.166 for that of the spouses.   They are statistically significant at 5 % level.

(4) Practice of Prevention of Diarrhoea

Table 8.3.10 to 8.3.13 illustrate the practice of what people know for diarrhoea prevention, with focusing on "using safe water", "proper hand-washing", "using proper latrine" and "refusing disposal in a pit properly".   Table 8.3.10 shows 67 out of 234 respondents (28.6%) do not actually use safe water.   As for proper hand-washing, use of proper latrine and proper refusal of disposal, 37 out of 67 (55.2%), 40 out of 97 (41.2%) and 16 out of 23 (69.6%) do not practice despite possession of the knowledge.

Statistically significant difference among districts is observed only in usage of safe water.   In Urambo District, 27 out of 56 respondents (48.2%) say they do not actually convert their knowledge into practice.   There are many households that do not use safe water in Igunga (11 out of 29, 37.9%) and Nzega Districts (15 out of 48, 31.3%).

Table 8.3.10   Knowledge and Practice on Prevention of Diarrhoea (1): Use Safe Water

| | | Practice | | | | | | Total | | |
		Yes			No					
Knowledge	Yes	Igunga	18	62.1%	Igunga	11	37.9%	Igunga	29	100.0%
		Nzega	33	68.8%	Nzega	15	31.3%	Nzega	48	100.0%
		Sikonge	17	73.9%	Sikonge	6	26.1%	Sikonge	23	100.0%
		Tabora Rural	33	84.6%	Tabora Rural	6	15.4%	Tabora Rural	39	100.0%
		Tabora Municipality	37	94.9%	Tabora Municipality	2	5.1%	Tabora Municipality	39	100.0%
		Urambo	29	51.8%	Urambo	27	48.2%	Urambo	56	100.0%
		Total	**167**	**71.4%**	**Total**	**67**	**28.6%**	**Total**	**234**	**100.0%**
	No	Igunga	0	0.0%	Igunga	1	100.0%	Igunga	1	100.0%
		Nzega	1	8.3%	Nzega	11	91.7%	Nzega	12	100.0%
		Sikonge	0	0.0%	Sikonge	22	100.0%	Sikonge	22	100.0%
		Tabora Rural	1	16.7%	Tabora Rural	5	83.3%	Tabora Rural	6	100.0%
		Tabora Municipality	4	66.7%	Tabora Municipality	2	33.3%	Tabora Municipality	6	100.0%
		Urambo	3	15.8%	Urambo	16	84.2%	Urambo	19	100.0%
		Total	**9**	**13.6%**	**Total**	**57**	**86.4%**	**Total**	**66**	**100.0%**
Total		Igunga	18	60.0%	Igunga	12	40.0%	Igunga	30	100.0%
		Nzega	34	56.7%	Nzega	26	43.3%	Nzega	60	100.0%
		Sikonge	17	37.8%	Sikonge	28	62.2%	Sikonge	45	100.0%
		Tabora Rural	34	75.6%	Tabora Rural	11	24.4%	Tabora Rural	45	100.0%
		Tabora Municipality	41	91.1%	Tabora Municipality	4	8.9%	Tabora Municipality	45	100.0%
		Urambo	32	42.7%	Urambo	43	57.3%	Urambo	75	100.0%
		Total	**176**	**58.7%**	**Total**	**124**	**41.3%**	**Total**	**300**	**100.0%**

Source: Results of Socio-economic Survey by JICA Study Team in 2010

Table 8.3.11 Knowledge and Practice on Prevention of Diarrhoea (2): Wash Hands Properly

			Practice					Total		
			Yes		No			Total		
Knowledge	Yes	Igunga	0	0.0%	Igunga	2	100.0%	Igunga	2	100.0%
		Nzega	14	50.0%	Nzega	14	50.0%	Nzega	28	100.0%
		Sikonge	2	50.0%	Sikonge	2	50.0%	Sikonge	4	100.0%
		Tabora Rural	2	28.6%	Tabora Rural	5	71.4%	Tabora Rural	7	100.0%
		Tabora Municipality	6	54.5%	Tabora Municipality	5	45.5%	Tabora Municipality	11	100.0%
		Urambo	6	40.0%	Urambo	9	60.0%	Urambo	15	100.0%
		Total	**30**	**44.8%**	**Total**	**37**	**55.2%**	**Total**	**67**	**100.0%**
	No	Igunga	1	3.6%	Igunga	27	96.4%	Igunga	28	100.0%
		Nzega	5	15.6%	Nzega	27	84.4%	Nzega	32	100.0%
		Sikonge	8	19.5%	Sikonge	33	80.5%	Sikonge	41	100.0%
		Tabora Rural	3	7.9%	Tabora Rural	35	92.1%	Tabora Rural	38	100.0%
		Tabora Municipality	6	17.6%	Tabora Municipality	28	82.4%	Tabora Municipality	34	100.0%
		Urambo	8	13.3%	Urambo	52	86.7%	Urambo	60	100.0%
		Total	**31**	**13.3%**	**Total**	**202**	**86.7%**	**Total**	**233**	**100.0%**
Total		Igunga	1	3.3%	Igunga	29	96.7%	Igunga	30	100.0%
		Nzega	19	31.7%	Nzega	41	68.3%	Nzega	60	100.0%
		Sikonge	10	22.2%	Sikonge	35	77.8%	Sikonge	45	100.0%
		Tabora Rural	5	11.1%	Tabora Rural	40	88.9%	Tabora Rural	45	100.0%
		Tabora Municipality	12	26.7%	Tabora Municipality	33	73.3%	Tabora Municipality	45	100.0%
		Urambo	14	18.7%	Urambo	61	81.3%	Urambo	75	100.0%
		Total	**61**	**20.3%**	**Total**	**239**	**79.7%**	**Total**	**300**	**100.0%**

Source: Results of Socio-economic Survey by JICA Study Team in 2010

Table 8.3.12 Knowledge and Practice on Prevention of Diarrhoea (3): Use Proper Latrine

			Practice					Total		
			Yes		No			Total		
Knowledge	Yes	Igunga	3	50.0%	Igunga	3	50.0%	Igunga	6	100.0%
		Nzega	16	64.0%	Nzega	9	36.0%	Nzega	25	100.0%
		Sikonge	4	40.0%	Sikonge	6	60.0%	Sikonge	10	100.0%
		Tabora Rural	11	61.1%	Tabora Rural	7	38.9%	Tabora Rural	18	100.0%
		Tabora Municipality	10	76.9%	Tabora Municipality	3	23.1%	Tabora Municipality	13	100.0%
		Urambo	13	52.0%	Urambo	12	48.0%	Urambo	25	100.0%
		Total	**57**	**58.8%**	**Total**	**40**	**41.2%**	**Total**	**97**	**100.0%**
	No	Igunga	0	0.0%	Igunga	24	100.0%	Igunga	24	100.0%
		Nzega	5	14.3%	Nzega	30	85.7%	Nzega	35	100.0%
		Sikonge	3	8.6%	Sikonge	32	91.4%	Sikonge	35	100.0%
		Tabora Rural	3	11.1%	Tabora Rural	24	88.9%	Tabora Rural	27	100.0%
		Tabora Municipality	5	15.6%	Tabora Urban	27	84.4%	Tabora Municipality	32	100.0%
		Urambo	9	18.0%	Urambo	41	82.0%	Urambo	50	100.0%
		Total	**25**	**12.3%**	**Total**	**178**	**87.7%**	**Total**	**203**	**100.0%**
Total		Igunga	3	10.0%	Igunga	27	90.0%	Igunga	30	100.0%
		Nzega	21	35.0%	Nzega	39	65.0%	Nzega	60	100.0%
		Sikonge	7	15.6%	Sikonge	38	84.4%	Sikonge	45	100.0%
		Tabora Rural	14	31.1%	Tabora Rural	31	68.9%	Tabora Rural	45	100.0%
		Tabora Municipality	15	33.3%	Tabora Municipality	30	66.7%	Tabora Municipality	45	100.0%
		Urambo	22	29.3%	Urambo	53	70.7%	Urambo	75	100.0%
		Total	**82**	**27.3%**	**Total**	**218**	**72.7%**	**Total**	**300**	**100.0%**

Source: Results of Socio-economic Survey by JICA Study Team in 2010

Table 8.3.13   Knowledge and Practice on Prevention of Diarrhoea (4): Refuse Disposal in a Pit Properly

			Practice					Total		
			Yes			No				
Knowledge	Yes	Igunga	0	-	Igunga	0	-	Igunga	0	-
		Nzega	2	33.3%	Nzega	4	66.7%	Nzega	6	100.0%
		Sikonge	0	0.0%	Sikonge	2	100.0%	Sikonge	2	100.0%
		Tabora Rural	1	50.0%	Tabora Rural	1	50.0%	Tabora Rural	2	100.0%
		Tabora Municipality	1	14.3%	Tabora Municipality	6	85.7%	Tabora Municipality	7	100.0%
		Urambo	3	50.0%	Urambo	3	50.0%	Urambo	6	100.0%
		Total	**7**	**30.4%**	**Total**	**16**	**69.6%**	**Total**	**23**	**100.0%**
	No	Igunga	1	3.3%	Igunga	29	96.7%	Igunga	30	100.0%
		Nzega	0	0.0%	Nzega	54	100.0%	Nzega	54	100.0%
		Sikonge	1	2.3%	Sikonge	42	97.7%	Sikonge	43	100.0%
		Tabora Rural	1	2.3%	Tabora Rural	42	97.7%	Tabora Rural	43	100.0%
		Tabora Municipality	3	7.9%	Tabora Municipality	35	92.1%	Tabora Municipality	38	100.0%
		Urambo	2	2.9%	Urambo	67	97.1%	Urambo	69	100.0%
		Total	**8**	**2.9%**	**Total**	**269**	**97.1%**	**Total**	**277**	**100.0%**
Total		Igunga	1	3.3%	Igunga	29	96.7%	Igunga	30	100.0%
		Nzega	2	3.3%	Nzega	58	96.7%	Nzega	60	100.0%
		Sikonge	1	2.2%	Sikonge	44	97.8%	Sikonge	45	100.0%
		Tabora Rural	2	4.4%	Tabora Rural	43	95.6%	Tabora Rural	45	100.0%
		Tabora Municipality	4	8.9%	Tabora Municipality	41	91.1%	Tabora Municipality	45	100.0%
		Urambo	5	6.7%	Urambo	70	93.3%	Urambo	75	100.0%
		Total	**15**	**5.0%**	**Total**	**285**	**95.0%**	**Total**	**300**	**100.0%**

Source: Results of Socio-economic Survey by JICA Study Team in 2010

Practice on diarrhoea prevention is also positively correlated with education level of the head of households and spouses.   The correlation coefficients are 0.157 for education of the head and 0.146 for that of the spouses.   They are statistically significant at 5% level.

(5)   Opportunities to Get Knowledge on Health and Hygiene

Table 8.3.14 and Figure 8.3.3 describe opportunities that the respondents can get knowledge and information on safe water and water-borne diseases like diarrhoea.   They have got the knowledge from TV and radio programmes most frequently (157 out of 300 respondents, accounting for 52.3%), followed by health facilities (147 out of 300, 49.0%).   On the other hand, few of them have got relevant information and knowledge on health and safe water from school teachers and village health workers (VHW), who are supposed to be facilitators of health promotion at frontline level.

Health facility is not the place where people frequently gather since it is not utilised until they get sick.   Nonetheless, many people think they get information in such places.   Therefore, that implies the opportunities to take knowledge on health are very limited.

Table 8.3.14   Opportunities to Get Knowledge on Health and Hygiene

District	No of Respondents	Health facility		School		TV/Radio programme		Seminar/Village		Others	
		n	%	n	%	n	%	n	%	n	%
Igunga	30	18	60.0%	2	6.7%	17	56.7%	1	3.3%	1	3.3%
Nzega	60	33	55.0%	18	30.0%	7	11.7%	1	1.7%	0	0.0%
Sikonge	45	24	53.3%	4	8.9%	13	28.9%	0	0.0%	0	0.0%
Tabora Rural	45	23	51.1%	3	6.7%	27	60.0%	1	2.2%	0	0.0%
Tabora Municipality	45	16	35.6%	1	2.2%	40	88.9%	0	0.0%	0	0.0%
Urambo	75	33	44.0%	18	24.0%	53	70.7%	2	2.7%	0	0.0%
Total	**300**	**147**	**49.0%**	**46**	**15.3%**	**157**	**52.3%**	**5**	**1.7%**	**1**	**0.3%**
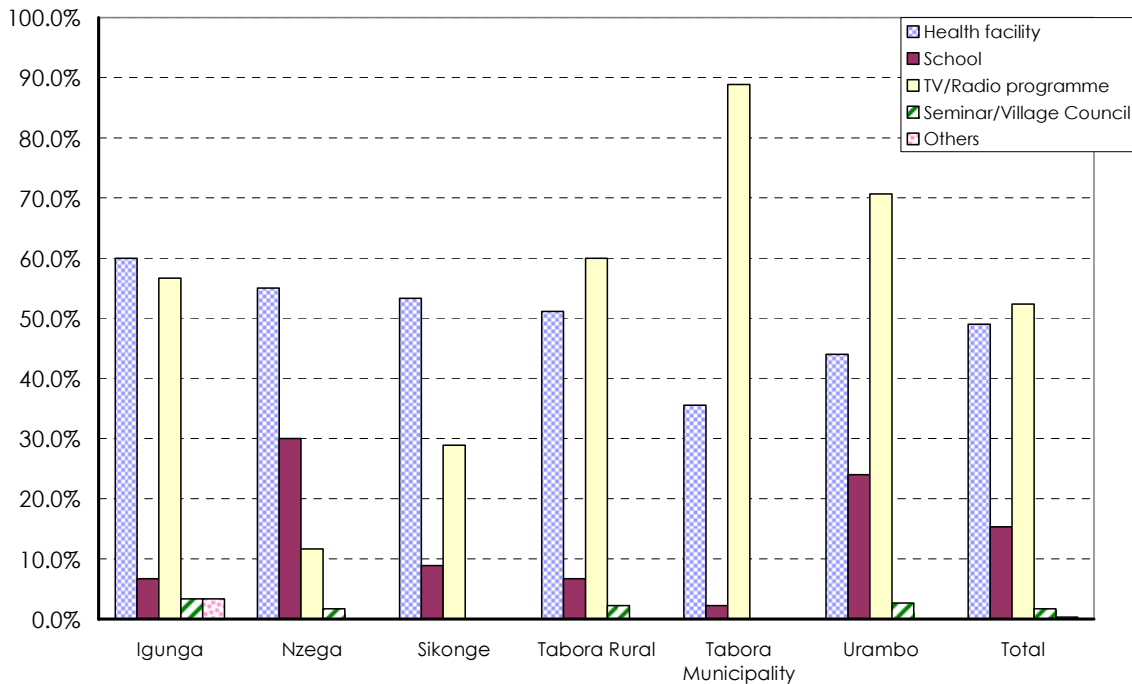
Note: Multiple answers are allowed.
Source: Results of Socio-economic Survey by JICA Study Team in 2010

Figure 8.3.3   Opportunities to Get Knowledge on Health and Hygiene

8.4   CURRENT SITUATION OF HEALTH EDUCATION IN TABORA REGION

Improvement of access to safe water and sanitation through the renovation or construction of facilities is a requisite for keeping people healthy.   That can be realised by proper utilisation of these facilities by people.   Therefore, it is essential for them to understand how to use the facilities as well as the importance of their proper utilisation.   Health education, which gives people such opportunities, is a key component of health promotion.

This section focuses on health education to observe the current situation of health promotion activities in Tabora Region.

8.4.1   FRONTLINE FACILITATORS OF HEALTH EDUCATION

In frontline level, health education is done in the villages and schools (mainly primary schools). VHW or Village Health Committees initiate the education in village level, while "Health Teachers" facilitate it at school level.

Their activities are regularly supported and supervised by health workers (clinical officers, etc.) at dispensaries or health centres covering the villages and District Health Officers DHOs or School Health Coordinators of Council Health Management Team (CHMT).   District Education Officer or District Community Development Officer also participates in the supportive supervision in some districts like Igunga and Nzega.

Based upon the interview with DHOs, around 50% of villages have trained VHWs.   These Village Councils usually select two VHWs (a male and a female) in a village.

The number of Health Teachers varies from district to district: 84 out of 150 primary schools have a trained Health Teacher in Urambo District, while there are 20 Health Teachers out of 83 primary schools in Sikonge.

8.4.2 HEALTH EDUCATION AT COMMUNITY LEVEL

As for the activities of health promotion in village level, District Operational Manual (DOM), which the MoW published in 2006 for implementation of WSDP, contains the topic as "household sanitation" (Ministry of Water 2006a and 2006c).   Education/sensitisation is one of the activities.

Currently all districts have adopted participatory approaches such as Community-Led Total Sanitation (CLTS) and Participatory Health and Sanitation Transformation (PHAST), and conducted training of health workers, VHWs and VHCs based upon them (Kamar Kar 2008; World Health Organization 1998).   MoW published the guidelines "for implementation of hygiene and prevention of HIV/AIDS" (Mwongozo wa Utekelezaji wa Shughuli za Usafi wa Mazingira, Usafi Binafsi na Uzuiaji wa Maambukizi na Kuenea kwa Virusi vya UKIMWI) in 2009 and intends to implement CLTS to expand access to sanitation (MoWI, 2009).

Igunga and Urambo Districts installed CLTS.   Igunga CHMT completed training of VHWs and/or VHCs of 11 wards for CLTS and is going to train five (5) wards in FY 2010/11.   Urambo CHMT implemented training of seven (7) health workers in health facilities and two (2) VHWs for CLTS in Council Comprehensive Health Plan (CCHP) of FY 2009/10.

Tabora Rural and Sikonge Districts have adopted PHAST.   Tabora Rural CHMT incorporates PHAST training in 12 villages into its CCHP of FY 2010/11.   Sikonge CHMT trained Village Health Committees (VHCs) in five (5) wards and is going to do for three (3) wards in FY 2010/11.

However, no districts can have covered all villages for health education at frontline level.

Based upon the interview with a VHW in Igunga District, major activities for health education and sensitisation include the topics such as proper hand-washing with use of soap and running water, protection of water sources, proper covering of foods, use of bed nets for malaria prevention, cleaning of surroundings, etc.   Promotion and construction of latrines is also an important activity.

However, it can be inferred that VHWs or VHCs cannot always perform well.   They usually organise lectures at health facilities, but it is difficult to cover a lot of people because of smaller number of health facilities than those of schools and villages.   As a tool for dissemination of knowledge on health, leaflets and posters are utilised at all districts, but it is not effective for illiterates (Figure 8.4.1).   In addition, VHWs or VHCs are forced to provide health education depending on their memories and experiences due to the absence of teaching guides or educational aids.   It is not appropriate from the view of standardisation of health education.

Source: Tabora Rural CHMT

Figure 8.4.1   Leaflet for Sensitisation on Diarrhoea Prevention

8.4.3 SCHOOL HEALTH ACTIVITIES

School health contains various activities including a series of lectures, instruction of hygiene and sanitation practices like proper hand-washing, use of pit latrines and cleaning of surroundings, school feedings, care of physical condition of pupils and students, etc.   DOM intends to promote formulation of "Sanitation Clubs" that will be role models in practising good hygiene and sanitation under proper instruction of Health Teachers.   It also includes the activity to review curriculum, educational aids, teaching guide to seek optimal methodology for instruction of school health.

Activities of school health in CCHP vary from district to district.   From the view that not all schools have a health teacher, CHMTs of Nzega, Tabora Rural, and Urambo are going to train 20, 14, and 26 teachers respectively in FY 2010/11.   Duration and contents of training also vary.
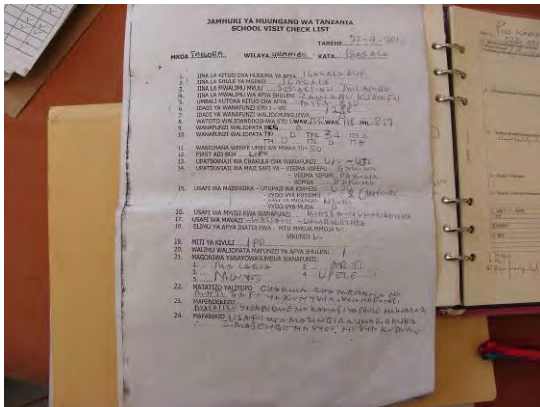
Source: Urambo CHMT

Figure 8.4.2   School Visit Check List

Current performance of school health is not so good in Tabora Region.   There is a school that is utilising posters produced locally as educational aids.   However, generally there are no teaching guides or educational aids.

Problems are also identified in practice of hygiene and sanitation.   Instruction of proper hand washing is not implemented in schools that have difficulty to access to water.   Sanitation Clubs are not formed at most of the schools, and some teachers totally do not know a term "Sanitation Club".   That symbolises DOM is not yet disseminated at frontline of health education.

In some districts DHO or an officer in charge of school health carries out supportive supervision based upon "the roster", an overall schedule of supportive supervision of CHMT.   It is determined by the number and geographical allocation of health facilities.   However, it is very difficult for him or her to cover the health and sanitation activities in schools that are much more than the health facilities.   In addition, the school visit check list (Figure 8.4.2), which he or she uses for supportive supervision, is not adequate to monitor and supervise the lectures and practices.

8.4.4 IMPLEMENTATION STRUCTURE OF HEALTH EDUCATION AT DISTRICT LEVEL

The Programme Operational Manual (POM) and DOM require the district councils to establish the DWST (Ministry of Water, 2006b and 2006c).   Chaired by DED, membership, areas of responsibility and major tasks are listed in Table 8.4.1.

Table 8.4.1   Membership, Responsibility and Tasks of DWST

Membership	Area of Responsibility	Tasks
District Executive Director (DED)	Chairperson	- Organise baseline survey
District Planning Officer (DPLO)	Deputy Chairperson	- Prepare DWSP
	Overall development planning	- Inform communities on WSDP
District Water Engineer (DWE)	Coordinator/Secretary	- Appraise application and proposals
	Water supply development	from communities
District Health Officer (DHO)	Hygiene, sanitation and HIV/AID	- Prepare ToR and tender documents
District Community Developmen Officer (DCDO)	Community development management	- Supervise contractors
		- Manage finance of sub-projects of DW!
District Education Officer (DEO)	School hygiene and sanitation	- Provide training to communities
District Treasurer	Financial management	- Monitor, evaluate and supervise communities
		- Report to CMT

Source: Ministry of Water (2006), *Programme Operational Manual*, pp19-21

According to POM and DOM, DWST is supposed to formulate the District Water and Sanitation Plan (DWSP).   However, only Igunga District has actually formulated and implemented the Plan so far.   Tabora Rural District employed a consultant to develop DWSP for FY 2011/12.

At present, the district councils in Tabora Region formulate the rural water and sanitation activities in each separate sector such as water, health and education and incorporate them into the District Annual Plan.   All CHMTs can manage to plan the health education activities in the category of health promotion or environmental health and sanitation in their CCHP.   However, it is inferred that they cannot review the actual performance of the activities and approaches critically and utilise lessons learned effectively for better planning in the following financial year.

8.5   ACCESS TO HEALTH SERVICE, SAFE WATER AND SANITATION

8.5.1 DISTRIBUTION OF HEALTH FACILITIES

In Tanzania, health service delivery system has a pyramid structure of referral system that consists of National Specialised Hospital, Referral Hospital, Regional Hospital, District Hospital, Health Centre and Dispensary from the top to the bottom.   As described in Table 8.5.1, Tabora Region has seven (7) hospitals including Kitete Regional Hospital, 19 Health Centres and 206 Dispensaries.

MoHSW has implemented its strategy of provision of health facilities in the current Health Sector Strategic Plan (HSSP) and Primary Health Services Development Programme (PHSDP) widely known as Mpango wa Maendeleo wa Afya ya Msingi (MMAM): one dispensary per village, one health centre per ward and one hospital per district (MoHSW 2007, p23; MoHSW 2009, p25). However, the actual distribution of health facilities in Tabora Region shows that many of the villages still do not have any facilities.

Table 8.5.1   Distribution of Health Facilities in Tabora Region (as of 2008)

District	Villages	Wards	Dispensary	Health Centre	Hospital
Igunga	96	26	29	5	2
Nzega	136	37	37	6	2
Sikonge	97	23	26	3	1
Tabora Rural	93	17	36	1	0
Tabora Municipality	43	11	37	1	1
Urambo	106	21	41	3	1
Total	**571**	**135**	**206**	**19**	**7**

Source: HMIS of Tabora RHMT

Population per dispensary, health centre and hospital is 11,196, 100,760 and 273,493 respectively in Tabora Region, larger than the average of Tanzania Mainland (Table 8.5.2). That implies more scarcity of the facilities in the region.

Table 8.5.2 Population per Health Facility in Tanzania Mainland

Region	Dispensary	Health Centre	Hospital
Arusha	7,377	49,671	135,467
Dar es Salaam	7,157	103,108	103,108
Dodoma	7,340	90,181	270,544
Iringa	5,264	45,100	111,246
Kagera	10,810	98,697	174,617
Kigoma	9,096	89,223	312,281
Kilimanjaro	4,756	42,802	85,605
Lindi	5,442	51,856	97,950
Manyara	9,003	116,135	193,558
Mara	7,746	69,363	217,999
Mbeya	7,262	74,497	135,847
Morogoro	7,666	59,469	150,959
Mtwara	7,674	78,661	251,716
Mwanza	9,877	86,290	234,216
Pwani (Coast)	4,442	49,528	141,509
Rukwa	6,556	47,106	317,968
Ruvuma	6,526	56,661	138,504
Shinyanga	10,647	107,936	391,268
Singida	7,847	81,090	135,150
Tabora	**11,196**	**100,760**	**273,493**
Tanga	7,385	59,078	166,492
Total	**7,591**	**71,430**	**168,165**

Source: Calculation by JICA Study Team Based upon the Data in Ministry of Health and Social Welfare (2008) *Tanzania Health Statistical Abstract, Tanzania Mainland 2008*, p12 and pp24-28

8.5.2 HUMAN RESOURCES FOR HEALTH

Health sector in Tanzania is facing a serious human resource crisis. According to the MoHSW (2008), there is a shortage of 90,722 health workers at all levels (53,214 for public health facilities and 37,508 for private). Only 35% of the posts are occupied in public health facilities and 14% are done in the facilities managed by faith-based organisations (FBO) and private entities.

Table 8.5.3 shows the current status of human resources for health in Tabora Region with focusing on medical doctors, assistant medical officers (AMO), clinical officers (CO) and nurses. 811 out of 1,576 posts for medical doctors, assistant medical officers, clinical officers and nurses (51.5%) are filled in 2008. It can be said that the situation in Tabora Region is better in terms of occupancy of the posts, but there are still a lot of vacancies.

Table 8.5.3 Human Resource Status by Cadre in Tabora Region (as of 2008)

Cadre	Required	Available	Shortage	% Available
Medical Doctor/Specialist	22	8	14	36.4%
Assistant Medical Officer	66	33	33	50.0%
Clinical Officer	637	294	343	46.2%
Nurse/Nursing Officer/Nurse Midwife	851	476	375	55.9%
Total	**1,576**	**811**	**765**	**51.5%**

Source: HMIS of Tabora RHMT

Table 8.5.4 describes coverage of population per health worker in Tanzania Mainland by cadre of medical officer (doctor), assistant medical officer, clinical officer and nurse (including nursing officer and nurse midwife).   It clearly shows the population in Tabora Region is provided health services by fewer workers than the average of Tanzania Mainland due to fewer health facilities.

Table 8.5.4   Population per Health Worker in Tanzania Mainland (Unit: thousand)

Region	Medical Officer	Assistant Medical Officer	Clinical Officer	Nurse
Arusha	22	20	5	2
Dar es Salaam	24	13	6	2
Dodoma	95	31	7	3
Iringa	58	51	16	2
Kagera	114	120	25	3
Kigoma	308	74	16	7
Kilimanjaro	58	60	4	1
Lindi	88	23	7	2
Manyara	92	32	7	2
Mara	167	34	10	4
Mbeya	64	31	5	3
Morogoro	56	40	5	4
Mtwara	71	35	8	3
Mwanza	144	38	20	4
Pwani (Coast)	32	16	3	2
Rukwa	121	35	11	3
Ruvuma	57	28	6	1
Shinyanga	115	58	10	6
Singida	65	24	10	2
Tabora	**132**	**47**	**11**	**4**
Tanga	58	21	5	2
Total	**64**	**31**	**7**	**3**

Source: Ministry of Health and Social Welfare (2008) *Tanzania Health Statistical Abstract, Tanzania Mainland 2008*, pp18-21

8.5.3 ACCESS TO SAFE WATER

As mentioned earlier, water supply coverage of the Tabora Region is 49.1%, almost the lowest level in Tanzania (MoWI, 2008).   However, the results of socio-economic survey by JICA Study Team reveal that many people are satisfied with the quality of drinking water that they use (Table 8.5.5).

In dry season, 145 out of 300 respondents (48.3%) use unprotected shallow wells as a source of drinking water, followed by dam/charco/pond (77 respondents, 25.7%) and rainwater (63 respondents, 21.0%).   Only 21 households interviewed (7.0%) get drinking water from boreholes with hand pump, while public taps are available for two (2) households.   14 out of 16 respondents (87.5%) are satisfied with the quality of drinking water from unprotected springs.   Users of protected shallow wells with hand pump (29 of 35 users, 82.9%), protected shallow wells with bucket (14 of 17 users, 82.4%), rainwater (47 of 63 users, 74.6%), dam/charco/pond (51 of 77 users, 66.2%) and boreholes with hand pump (13 of 21 users, 61.9%) also express satisfaction with these sources.

In case of dry season, 154 out of 300 respondents (51.4%) use unprotected shallow wells, while 68 (22.7%) get drinking water from dam/charco/pond.   Users are more highly satisfied with the water from most of the sources.

These results imply the households using these sources of drinking water think they can access to "safe water".

Table 8.5.5   Perception on Quality of Drinking Water

Source of Drinking Water		Rainy season						Dry season					
		Very good	Good	Fair	Bad	Very bad	Total	Very good	Good	Fair	Bad	Very bad	Total
Stream/River	n	0	1	0	2	1	4	0	2	2	7	2	13
	%	0.0%	25.0%	0.0%	50.0%	25.0%	100.0%	0.0%	15.4%	15.4%	53.8%	15.4%	100.0%
Charco/Pond	n	2	23	26	22	4	77	1	14	29	14	10	68
	%	2.6%	29.9%	33.8%	28.6%	5.2%	100.0%	1.5%	20.6%	42.6%	20.6%	14.7%	100.0%
Rainwater	n	2	23	22	15	1	63	0	1	0	2	0	3
	%	3.2%	36.5%	34.9%	23.8%	1.6%	100.0%	0.0%	33.3%	0.0%	66.7%	0.0%	100.0%
Unprotected spring	n	0	5	9	2	0	16	0	4	7	2	0	13
	%	0.0%	31.3%	56.3%	12.5%	0.0%	100.0%	0.0%	30.8%	53.8%	15.4%	0.0%	100.0%
Unprotected shallow well	n	7	35	41	55	7	145	6	45	53	45	5	154
	%	4.8%	24.1%	28.3%	37.9%	4.8%	100.0%	3.9%	29.2%	34.4%	29.2%	3.2%	100.0%
Protected spring	n	0	1	1	2	0	4	0	0	0	0	0	0
	%	0.0%	25.0%	25.0%	50.0%	0.0%	100.0%	-	-	-	-	-	-
Protected shallow well with bucket	n	0	9	5	3	0	17	1	6	7	1	0	15
	%	0.0%	52.9%	29.4%	17.6%	0.0%	100.0%	6.7%	40.0%	46.7%	6.7%	0.0%	100.0%
Protected shallow well with handpump	n	3	18	8	5	1	35	4	17	11	3	0	35
	%	8.6%	51.4%	22.9%	14.3%	2.9%	100.0%	11.4%	48.6%	31.4%	8.6%	0.0%	100.0%
Borehole with handpump	n	2	4	7	8	0	21	2	7	13	7	0	29
	%	9.5%	19.0%	33.3%	38.1%	0.0%	100.0%	6.9%	24.1%	44.8%	24.1%	0.0%	100.0%
Public tap	n	0	1	0	1	0	2	0	1	1	0	0	2
	%	0.0%	50.0%	0.0%	50.0%	0.0%	100.0%	0.0%	50.0%	50.0%	0.0%	0.0%	100.0%
Piped into yard/plot	n	0	0	0	1	0	1	0	0	2	0	0	2
	%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Piped into dwelling	n	0	0	1	1	0	2	2	0	2	0	0	4
	%	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%	50.0%	0.0%	50.0%	0.0%	0.0%	100.0%
Water vendor	n	1	0	0	1	0	2	2	0	2	0	0	4
	%	50.0%	0.0%	0.0%	50.0%	0.0%	100.0%	50.0%	0.0%	50.0%	0.0%	0.0%	100.0%

Source: Results of Socio-economic Survey by JICA Study Team in 2010

8.5.4 ACCESS TO SANITATION

With regards to availability of toilets in villages, as shown in Table 8.5.6, 66.1% of the villages use the traditional pit latrine.   This latrine is dug one meter deep and is placed between two rocks, surrounded by grass.   18.9% use either the traditional pit latrine or no toilet.   13.1% of the villages answered that the majority of households have no sanitation facility and use a bush as a substitute.   V.I.P. The vent acts to draw odour and insects into the pit and up the vent.   In remote areas, flush toilets are not seen at all.

Table 8.5.6   Types of Pit Latrines in Villages by District

District	Traditional pit latrine	Mix of traditional pit latrine and no latrine	No latrine	Ventilation improved latrine
Igunga	39.8%	45.9%	12.2%	2.1%
Nzega	66.0%	1.3%	30.1%	2.6%
Sikonge	94.3%	0.0%	5.7%	0.0%
Tabora Rural	98.2%	0.9%	0.9%	0.0%
Tabora Municipality	95.8%	0.0%	4.2%	0.0%
Urambo	38.4%	50.0%	8.0%	3.6%
Total	**66.1%**	**18.9%**	**13.1%**	**1.9%**

Source: Results of key informant interview by JICA Study Team in 2009

8.6   DISCUSSIONS – PROBLEM IDENTIFICATION

This section is to analyse problems of health promotion in Tabora Region, especially focusing on health education based upon the observations in the previous sections.   As the objective of health promotion is disease prevention, the core problem in the context of rural water supply in Tabora Region is that people cannot prevent should-be-prevented water borne diseases.   And the two factors are attributable: people do not know preventability of these diseases and how to prevent;

and they are not in the circumstances for utilisation of their knowledge on disease prevention due to inadequate facilities such as boreholes and pit latrines.

Health education, which is an intervention to people's knowledge on health and hygiene, is reviewed below from the viewpoints of planning, implementation and monitoring/supportive supervision in Tabora Region.

8.6.1 PLANNING OF HEALTH EDUCATION

All district councils in Tabora Region successfully incorporate the activities of health education into CCHP and District Annual Plan. They are also reflected in DWSP of Igunga District. These activities are relevant, taking consideration of the current situation that no district councils can allocate trained VHWs/VHCs and Health Teachers in all villages.

Meanwhile, for effective planning of health education in Tabora Region, it is necessary for all district councils to review the following points:

1) What is the effective approach to let villagers and school children know the health information and knowledge?

2) How have the trained VHWs/VHCs and Health Teachers performed so far?

The first point closely relates to what human resources should be developed in the existent plan. MoW mentions implementation of CLTS as a basic approach for improvement of sanitation in its guideline published in 2009 (MoWI, 2009a), but some districts like Tabora Rural and Sikonge still stick to PHAST. It is a responsibility of regional level on how to deal with the situation. Effectiveness of tools for health education and sensitisation should be also reviewed as approaches for frontline level. Leaflets have been printed as a tool for sensitisation in many districts in Tabora Region, but it is not effective for illiterates.

The second point is a huge challenge for all districts. It is inferred that they cannot review the actual performance and difficulties of VHWs and Health Teachers and effectively utilise the lessons learned for planning in the following financial year, as they have formulated the activities with the same contents and approaches every year.

8.6.2 IMPLEMENTATION OF HEALTH EDUCATION

As described earlier, actual performance of health education is not high. VHWs and Health Teachers provide education without any teaching guides or educational aids. Even if participatory approaches such as CLTS and PHAST are adopted at district level, they do not have any tools to effectively implement them at frontline level. Some of the materials can be developed locally, even at village level, but most of the VHWs and teachers do not know how to do. This is an obstacle for standardisation of health education.

The socio-economic survey conducted by JICA Study Team in 2010 shows that 203 out of 300 respondents and 49 out of 300 selected "water supply facility and services" and "of health clinics and services" respectively as their priorities for improvement of living conditions. However, that does not automatically mean the promotion of disease prevention as an invisible phenomenon. In this context, it might be difficult for VHWs/VHCs to provide health education in their villages, as DHO in Sikonge District faced a difficulty to hold a meeting exclusively for health issues in a village.

As for school health, Sanitation Clubs are not formed at most of the schools in Tabora Region. Some teachers do not know even a term of "Sanitation Club". It is an activity clearly mentioned in DOM with a lot of expectation. However, current situation in Tabora Region means contents of the manual are not disseminated to the frontline of school health. This is a responsibility of district level. DWST, a district inter-sectoral body for water and sanitation, is required to make a

collective approach as school health is a topic of "education" for "health" described in a manual of "water" sector.

8.6.3 MONITORING AND SUPERVISION OF HEALTH EDUCATION

Without any teaching guides or educational aids, most of VHWs/VHCs and Health Teachers technically depend upon monitoring and supportive supervision from district level.   Currently in most of the districts in Tabora Region, DHO or an officer in charge of school health and health workers in health facilities deal with monitoring and supervision of health education.

CHMT implements monitoring and supportive supervision based upon the roster, an overall schedule of supervision.   However, it is very difficult for him/her to cover the activities in schools that are much more than the health facilities.   Moreover, formats of the school visit check list for supportive supervision vary among districts and the contents are not adequate to effectively supervise the lectures and practices.

8.7   CONCLUSION – IMPLICATION FOR BETTER HEALTH PROMOTION

Based upon the analysis in the previous section, there is room for improvement of health education at any phases of the cycle.   In the planning stage it is necessary to review the current approach for health education to seek what is most effective.   Reinforcement of evaluation mechanism is a requisite including the review of monitoring tool.

In the phase of implementation, it is essential for VHWs/VHCs and Health Teachers to have teaching guides and educational aids for health education.   Currently there are no nationally authorised guides, so it is possible to develop them in regional level.

It is also necessary to seek diversity of tools for health education and sensitisation.   Some districts like Tabora Rural have already had experiences to utilise handmade drawings and cultural groups for sensitisation on health issues.   As some of the tools can be developed locally, it can be effective for VHWs/VHCs and teachers to learn how to do.

Actually approaches adopted by the districts vary, and the experiences of a district can be good lessons for others.   In this sense, it can be effective to share the experiences regularly.   In case of difficulty that Sikonge District faced, a solution will be to integrate health issues as an agenda in the other meeting like operation and maintenance of water points and community development.

As for monitoring and supportive supervision of health education, it is necessary to reschedule with involving with the other relevant sectors like education and community development.   For example, DHO or School Health Coordinator can directly participate in the monitoring of schools by DEO, or DHO can ask DEO to monitor school health activities with incorporating the items on school health into the checklist.   DWST, a district inter-sectoral body, is a good opportunity to enable such collective approaches.

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CHAPTER 9   DETAILED SURVEY AND OUTLINE DESIGN ON THE PRIORITY PROJECT

9.1   GENERAL

Detailed survey was carried out on the Priority Project (refer, Chapter 6) selected from the rural water supply plan which was formulated in the Study for designing of water supply schemes and estimation of approximate implementation cost.

The water supply plan formulated in the Interim Report was revised considering the results of these surveys.   Based on the revised water supply plan, water supply schemes designed and implementation cost was estimated.

9.2   TARGET VILLAGE AND WATER SUPPLY PLAN (INITIAL PLAN)

The target villages are 20 villages as mentioned in Chapter 6.   Those are shown in Table 9.2.1 together with the water supply plan.   The initial plan was to construct six (6) Level-2 water supply schemes in six (6) villages and 174 Level-1 schemes in 18 villages.

Table 9.2.1   Target Villages and Water Supply Plan for the Priority Project

District /Municipality	Ward	Village	Population 2009	Population 2020	Population served by the Project (2020)	Type of Water Supply Scheme	Number of Level-2 Sub -Project	Number of Level-1 Sub -Project
Igunga District	Mwisi	Busomeke	3,618	5,227	1,750	Level-1	-	7
	Mwisi	Kalemela	2,429	3,509	1,250	Level-1	-	5
Nzega District	Ijanija	Makomelo	1,005	1,319	1,069	Level-1	-	5
	Lusu	Isanga	9,084	11,919	8,500	Level-2,Level-1	1	22
	Miguwa	Kitangili	2,664	3,496	250	Level-1	-	1
	Wela	Wela	1,753	2,301	1,801	Level-1	-	7
Sikonge District	Igigwa	Kasandalala	2,282	3,332	3,332	Level-1	-	14
	Kipanga	Usunga	1,894	2,766	2,766	Level-1	1	0
	Pangale	Mpombwe	3,435	5,015	4,765	Level-2,Level-1	1	10
Tabora Rural District	Kizengi	Mpumbuli	1,820	2,658	2,408	Level-2	1	0
	Mabama	Mabama	4,329	6,321	6,071	Level-2,Level-1	1	4
	Ufulua	Ufuluma	5,741	8,382	3,250	Level-1	-	13
Tabora Municipality	Kakola	Kakola	2,015	3,483	3,233	Level-2,Level-1	1	1
	Misha	Misha	759	1,312	1,312	Level-1	-	6
	Uyui	Uyui	3,138	5,424	5,174	Level-1	-	20
Urambo District	Imalamakoye	Imalamakoye	2,509	4,292	3,000	Level-1	-	12
	Kapilula	Kapilula	1,568	2,682	2,250	Level-1	-	9
	Kiloleni	Kalembela	3,131	5,356	5,106	Level-1	-	21
	Kiloleni	Kiloleni	1,653	2,828	2,500	Level-1	-	10
	Uyowa	Nsungwa	6,911	11,821	1,750	Level-1	-	7
Total			61,737	93,443	61,537		6	174

9.3   TEST WELL DRILLING

The test well drilling was carried out to confirm whether water sources suitable for the Level-2 schemes were available or not, because Tabora area was a difficult area to develop groundwater.

9.3.1   TEST WELL DRILLING PLAN

(1)   Criteria for successful water source

The following two (2) criteria were applied to evaluate the successful water source.

<Groundwater yield>

Capable of yielding water to satisfy the water demand of each target village planned in the Development Study.

<Water Quality>

To satisfy the WHO Guideline (2008) for items related to health significance except for Fluoride, and the Tanzanian Health Standard (2008) for Fluoride and other items. Water quality standard and items to be analyzed are shown in Table 9.3.3.

(2) Drilling sites

Ufuluma Village in the Tabora Rural District was added to the target of Level-2 by the Study Team as a result of the field survey. Two (2) test wells were basically allocated to each water source, therefore, a total of 14 test wells were planned to be drilled. The second test well will be drilled if the first well is not successful. In addition, three (3) test wells were sunk in Igunga District to evaluate the groundwater quality. Thus, the total number of test wells becomes 17 in maximum. Ufuluma Village in Tabora Rural District was added based on the field survey by the Study Team. The test well drilling plan is shown in Table 9.3.1.

The actual number of test wells drilled was 16 wells as shown in Table 9.3.2.

(3) Alternative solution in case no suitable groundwater source is available

Results of test well drilling are evaluated applying the criteria described in (1) above. If quantity of yield of well is not enough for the Level-2 scheme, a Level-1 scheme is provided instead of Level-2. When water quality is not suitable for drinking, the village is excluded from the target village.

No alternative village for Level-2 is included in the target villages even a village is excluded, because no other village meets the criteria for Level-2 water supply scheme.

Table 9.3.1   Test Well Drilling Plan

District/Municipality	Village	Water Source (well)	Maximum Number of Test Well (well)
Nzega District	Isanga	1	2
Sikonge District	Usunga	1	2
	Mpombwe	1	2
Tabora Rural District	Mpumbuli	1	2
	Mabama	2	4
	Ufuluma	1	-
Tabora Municipality	Kakola	1	2
Sub-Total		8	14
Igunga District (for evaluation of water quality)	Igumo	-	1
	Buhekela	-	1
	Kagongwa	-	1
Sub-Total		0	3
Grand Total		8	17

9.3.2 EVALUATION OF TEST WELL DRILLING

Results of the test well drilling are shown in Table 9.3.2.

Table 9.3.2　Result of Test Well Drilling

Village	Well No.	Depth (m)	Yield (m3/h)	Fluoride (mg/L)	Evaluation
Nzega District					
Isanga	No. 1	85	3.7	2.40	Yield: suitable for Level-2 by 2 wells
	No. 2	80	3.0	1.10	Fluoride: A～B
Sikonge District					
Usunga	No. 1	98	0.2	1.46	Yield: Insufficient forLevel-2 but sufficient for Level-1, Fluoride: A
	No. 2	150	0.8	2.53	Yield: Insufficient forLevel-2 but sufficient for Level-1, Fluoride: B
Mpombwe	No. 1	79	Dry	—	Unsuccessful
	No. 2	92	0.1	1.10	Yield: Insufficient, Fluoride: A, Unsuccessful
Tabora Rural District					
Mpumbuli	No. 1	50	Dry	—	Unsuccessful
	No. 2	130	9.0	3.95	Yield: suitable for Level-2, Fluoride: B
Mabama	No. 1	79	14.0	1.50	Yield: suitable for Level-2, Fluoride: A
	No. 2	82	0.8	2.24	Yield: Insufficient forLevel-2 but sufficient for Level-1, Fluoride: B
	No. 3	86	Scarce	3.20	Yield: Insufficient for both Level-2 and Level-1, Fluoride: B
Ufuluma	No. 1	86	Scarce	—	Unsuccessful
Tabora Municipality					
Kakola	No. 1	108	6	1.61	Yield: suitable for Level-2, Fluoride: B
Igunga District（for Confirmation of Water Quality）					
Igumo		80	15.2 (1.0)	7.00	Yield: suitable for Level-1, Fluoride: C
Buhekela		70	Dry	-	Unsuccessful
Kagongwa		82	Dry	-	Unsuccessful

Note on Fluoride content

A : 　　　　within the WHO Guideline (F＜1.5 mg/L)

B : 　　　　more than the WHO Guideline but within the Tanzania Health Standard (1.5＜F＜4 mg/L)

C : 　　　　more than the Tanzania Health Standard (4 mg/L＜F)

(1)　Evaluation of groundwater yield

A suitable groundwater source for Level-2 was obtained in four (4) villages: Isanga Village in Nzega District, Mpumbuli Village and Mabama Village in the Tabora Rural District, and Kakola Village in Tabora Municipality.　However, no suitable groundwater source was obtained in three (3) villages: Usunga Village and Mpombwe Village in Sikonge District and Ufuluma Village in Tabora Rural District.

Table 9.3.3　Result of Water Quality Analyses

	Aspects and Items	Unit	Tanzania Health Standard (2008)	WHO Guideline (2008)	Nzega District Isanga 1	Nzega District Isanga 2	Sikonge District Mpombwe	Sikonge District Usunga 1	Sikonge District Usunga 2	Tabora Rural District Mpumbuli	Tabora Rural District Mabama 1	Tabora Rural District Mabama 2	Tabora Municipality Kakola	Igunga District Igumo
Microbial aspects	1 Total coliform bacteria	count/100mL	0	-	0	0	0	0	0	0	0	0	0	0
	2 Escherichia coli.	count/100mL	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals that of health significance	3 Cadmium (Cd)	mg/L	0.05	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	4 Lead (Pb)	mg/L	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	5 Arsenic (As)	mg/L	0.05	0.01	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	6 Fluoride (F)	mg/L	4	1.5	2.4	1.1	1.1	1.46	2.53	3.95	1.5	2.24	1.61	7
	7 Nitrate (NO3)	mg NO3/L	75	50	0.479	0.17	0.477	1	0.9	0.5	0.29	1.76	0.02	0.291
	8 Nitrite (NO2)	mg NO2/L	-	3/0.2	0.01	0.01	0.02	0.6	0.01	0.01	0.01	0.02	0.01	0.01
	9 Nickel (Ni)	mg/L	-	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	10 Manganese (Mn)	mg/L	0.5	0.4	0.01	0.01	1.5	0.05	0.01	0.01	0.01	0.01	0.01	0.01
Acceptability aspects	11 Total hardness	mg/L	600	600	300	300	225	200	125	200	325	200	425	250
	12 Calcium (Ca)	mg/L	100	-	80	60	50	60	40	50	100	70	160	60
	13 Magnesium (Mg)	mg/L	100	-	24.3	36.48	24.3	12.16	6.08	18.24	18.24	6.08	6.08	24.32
	14 Iron (Fe)	mg/L	1.0	-	0.01	0.01	3.02	0.64	0.01	0.02	0.01	0.02	0.01	0.01
	15 Zinc (Zn)	mg/L	15.0	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	16 Copper (Cu)	mg/L	3.0	2	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
	17 Chloride (Cl)	mg/L	-	-	88.6	53.1	88.6	194.97	53.17	212.7	124.07	141.8	159.5	70.9
	18 TDS	mg/L	2,000	-	475.2	377.8	459.2	468	134	685	592	590	600	570.9
	19 Ammonium (NH3-NH4)	mg/L	-	1.5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	21 pH	-	6.5-9.2	-	7.6	7.4	7.6	7.5	7.8	7.7	7.1	7.2	7.7	7.8
	22 Taste	dilution	Not Objectionable	-	no	no	no	no	no	no	no	no	no	no
	23 Odour	dilution	Not Objectionable	-	no	no	no	no	no	no	no	no	no	no
	24 Colour	mg Pt/L	50	15	0	0	0	0	0	0	0	0	0	0
	25 Turbidity	NTU	25	5	0.99	2.53	942	1575	3.03	0.861	3.81	0.664	0.964	0.44
Items related to characteristics of	26 Temperature (T)	°C	-	-	28.6	28.7	28.8	26.5	26	28	26	26	25	28.7
	27 Conductivity (EC)	mS/m	-	-	86.4	68.7	83.5	93.7	268	137.5	118.3	118.1	120	103.8
	28 Sodium (Na)	mg/L	-	-	60.2	18.8	86.9	119.37	3.22	220.5	121.9	176.41	79.81	121.4
	29 Potasium (K)	mg/L	-	-	1.5	2.4	3.3	7.7	2.2	4.9	1.7	6	2.1	4.6
	30 Biocarbonate (HCO3)	mg/L	-	-	300	300	200	200	50	200	325	200	300	250
	31 Sulphate (SO4)	mg/L	-	-	0.01	0.01	1.7	8	9.6	250	0.01	70	48	18.72

(2) Evaluation of Water Quality

A total of 31 water quality items were analysed.   The results are shown in Table 9.3.3.

As the result of water quality analyses," Items related to Health Significance" except for Fluoride contents are lower than those of the WHO Guideline (2008) and Fluoride contents and others are lower than those of the Tanzania Health Standard (2008).

9.4 SELECTION OF WATER SUPPLY SCHEMES BY THE RESULTS OF TEST WELL DRILLING

Among the seven (7) target villages for Level-2, a necessary groundwater source was obtained in Isanga Village in Nzega District, Mpumbuli Village and Mabama Village in Tabora Rural District, and Kakola Village in Tabora Municipality.   However, no suitable groundwater source was obtained in the remaining three (3) villages.   Therefore, the Level-2 water supply schemes will be constructed in the villages where a suitable groundwater source was obtained.   The Level-1 water supply schemes will be constructed in other villages.   Although the Level-2 water supply schemes will be constructed in the four (4) villages, some Sub-Villages in those villages are excluded from the service area of the Level-2 schemes due to unsuitable dwelling types, and topographical and hydrogeological conditions.   Such Sub-Villages will be supplied water by Level-1 instead of Level-2.

9.5 PROPOSED SITES FOR LEVEL-1 WATER SUPPLY SCHEMES

Considering the study results described above, the Level-1 schemes were planned to be constructed in 19 villages.   Three (3) villages out of 19, both Level-2 and Level-1 schemes will be constructed. The filed survey was carried out to select the proposed sites for the Level-1 schemes considering the population, dwelling type (dense or scarce), topographical and hydrogeological conditions and opinion of community people.   Finally, 115 sites were selected as the proposed sites for the Level-1 schemes.   One (1) sub-village in Kakola Village was originally excluded from the service area of the Level-2 scheme in the plan, therefore, the sub-villages was to be supplied by the Level-1 scheme.   However, it was confirmed by the Study in Japan that the Level-2 scheme in Kakola was capable to cover the sub-village.   Therefore, the plan was changed to supply the sub-village by the Level-2 scheme instead of the Level-1 scheme.   Accordingly, one (1) Level-1 scheme in the sub-village was cancelled and the total number of the Level-1 schemes became 114.

Electro-Magnetic surveys were carried out at two (2) or three (3) sites in 16 villages where construction of the Level-1 schemes were requested.   However, detailed geophysical surveys are required to decide the drilling sites of deep wells for the Level-1 schemes.

9.6 REVISION OF WATER SUPPLY PLAN FOR THE PRIORITY PROJECT

The water supply plan for the priority project was formulated in the Interim Report submitted in March 2010 as shown in Table 9.2.1.   The plan was revised considering the study results described in 9.3 to 9.5 above.   As the result, the number of water supply schemes was changed as follows.   The Level-2 schemes were reduced from six (6) to four (4) and the Level-1 schemes became 114 sites from 174 sites.   Those are shown in Table 9.6.1 and Figure 9.9.1 at end of this chapter.

Table 9.6.1   Revised Water Supply Plan for the Priority Project

District /Municipality	Ward	Village	Population 2009	Population 2020	Population served by existing WSS (2009)	Coverage by existing WSS (2009) (%)	Coverage by existing WSS (2020) (%)	To be served by the project (2020)	Number of Level-2 Sub-projects	Population served by Level-2 (2020)	Number of Level-1 Sub-projects	Population served by Level-1 (2020)	Population served by the Project (2020)	Total Population served (2020)	Coverage (by the Project: 2020) (%)	Coverage* (Target Population: 2020) (%)
Igunga	Mwisi	Busomeke	3,618	5,227	250	7	5	4,977	0	0	7	1,750	1,750	2,000	34	38
	Mwisi	Kalemala	2,429	3,509	0	0	0	3,509	0	0	5	1,250	1,250	1,250	36	36
	Ijanja	Makomelo	1,005	1,319	250	25	19	1,069	0	0	6	1,069	1,069	1,319	81	100
Nzega	Lusu	Isanga	1,491	1,956	0	0	0	1,956	1	1,956	0	0	1,956	1,956	100	100
	Miguwa	Kitangili	2,664	3,496	0	0	0	3,496	0	0	10	2,500	2,500	2,500	72	72
	Wela	Wela	1,753	2,301	500	29	22	1,801	0	0	7	1,750	1,750	2,250	76	98
	Igigwa	Kasandalala	2,282	3,332	250	11	8	3,082	0	0	7	1,750	1,750	2,000	53	60
Sikonge	Kipanga	Usunga	1,894	2,766	250	13	9	2,516	0	0	5	1,250	1,250	1,500	45	54
	Pangale	Mpombwe	3,435	5,015	250	7	5	4,765	0	0	8	2,000	2,000	2,250	40	45
	Kizengi	Mpumbuli	2,157	3,148	0	0	0	3,148	1	2,658	3	490	3,148	3,148	100	100
Tabora Rural	Mabama	Mabama	4,329	6,321	500	12	8	5,821	1	5,471	2	350	5,821	6,321	92	100
	Ufuluma	Ufuluma	5,741	8,382	250	4	3	8,132	0	0	7	1,750	1,750	2,000	21	24
	Kakola	Kakola	2,015	3,483	0	0	0	3,483	1	2,983	2	500	3,483	3,483	100	100
Tabora Urban	Misha	Misha	759	1,312	0	0	0	1,312	0	0	5	1,250	1,250	1,250	95	95
	Uyui	Uyui	3,138	5,424	250	8	5	5,174	0	0	8	2,000	2,000	2,250	37	42
	Imalamakoye	Imalamakoye	2,509	4,292	1,000	40	23	3,292	0	0	4	1,000	1,000	2,000	23	47
Urambo	Kapilula	Kapilula	1,568	2,682	0	0	0	2,682	0	0	5	1,250	1,250	1,250	47	47
	Kiloleni	Kalembela	3,131	5,356	0	0	0	5,356	0	0	7	1,750	1,750	1,750	33	33
	Kiloleni	Kiloleni	1,653	2,828	250	15	9	2,578	0	0	6	1,500	1,500	1,750	53	62
	Uyowa	Nsungwa	6,911	11,821	250	4	2	11,571	0	0	10	2,500	2,500	2,750	21	23
Total			54,482	83,970	4,250	7.8	5.1	79,720	4	13,068	114	27,659	40,727	44,977	48.5	53.6

9.7   OUTLINE DESIGN OF WATER SUPPLY SCHEMES

9.7.1   BASIC CONCEPT

(1)   The Target Year of the Project and Population to be Served

The target year of the Project is set 2020 as agreed in the discussion of the Scope of the Works of the Project.

Population in 2020 was projected by using the population surveyed by the Study Team in October 2010 and population growth rates estimated by National Bureau of Statistics, because no census data was available after the census in 2002.   Population growth rates applied are shown in Table 9.7.1.   The projected population in each District/Municipality is shown in Table 9.2.1.   The population growth rate is high in Tabora Municipality and Urambo District, and low in Nzega District.   The average growth rate of the Tabora Region is 3.6%.   Population will be increased to 79,720 in 2020.

Table 9.7.1   Population Growth Rate of each District/Municipality

District/Municipality	Growth Rate (%)	District/Municipality	Growth Rate (%)
Igunga District	3.4	Tabora Rural District	3.5
Nzega District	2.5	Tabora Municipality	5.1
Sikonge District	3.5	Urambo District	5.0

Source : The 2002 Population and Housing Census (National bureau of Statistics, 2003)

(2)   Water Demand

Unit water demand in Tanzania is 25 liters/capita/day.   Water demand of the Project was estimated by the following formula.

(unit water demand) x (population) = (water demand)

There are some schools and medical facilities (mainly dispensaries) and most of the users are the community people in the same village.   If water demand of such facilities is considered, the target population will be duplicated.   It will put too much pressure on the water supply schemes and overburden the water tariff by the community people.   Therefore, the water demand of such facilities was not considered in the Project.

Considering the situation above, water demand and withdrawal plan of intake were set as shown in Table 9.7.2.

Table 9.7.2   Water Demand and Pumping Plan for the Target Villages of Level-2

District /Municipality	Village	Population to be Served	Water Demand (m³/day)	Pumping Rate (m³/hour)	Operation Hour (hour)
Nzega District	Isanga	1,956	48.90	3.36	16
Tabora Rural District	Mupumbuli	3,148	66.45	6.09	12
	Mabama	6,321	136.78	12.54	12
Tabora Municipality	Kakola	3,483	74.58	5.86	14

(3)   Design Flow and Hydraulic Calculation

The daily average flow is set in the Design Manual (MoW, 2009) considering 20% of leakage from the system.   However, 10% of leakage was considered in the Study because the water supply schemes would be constructed by the Japanese contractor under the supervision by the consultant. The following concept was agreed with the Tanzanian side in the meeting held in November in Tabora and Dar es Salaam.   The next formula was applied to obtain the daily average flow.

Daily average flow (m³/day) = Design daily water demand (m³/day) x (1 + leakage (10%))

Daily maximum flow is from 20 to 30% in general, however, it is not considered in the Study in order to avoid over capacity of water supply schemes which will require too much overburden of operation and maintenance cost to the community people.

Daily maximum flow (m^3/day) = Daily average flow (m^3/day) x 110%

Hourly maximum flow was set at the peak time three (3) hours in the morning and three (3) hours in the evening.

Hourly maximum flow (m^3/day) = Daily maximum flow (m^3/day) / 6 (hours)

Operation hours of the intake are basically 12 hours, and 14 hours in maximum considering operation and maintenance.   In case of the commercial power supply, the operation hours were set at 16 hours.

Hazen-William's Formula was applied for hydraulic calculation.

$$H = 10.666 \times C^{-1.85} \times D^{-4.87} \times Q^{1.85} \times L$$

   H: Friction loss head (m)

   C: Coefficient of velocity (110) including loss of frock (Design Standard for Water Works in Japan

   D: Inner diameter (m)

   Q: Flow rate (m^3/sec)

   L: Distance (m)

The diameter of the pipes was decided considering the result of hydraulic calculation assuming the velocity in pipes as less than 0.6 m/sec.

The water hammer was taken into consideration in designing transmission pipelines.

The water head at the public water points should be 5m or more and less than 25m as specified in the Design Manual.   However, if it is difficult to keep 3m of water head in minimum due to topographical or economical reasons at a public water point, such water point is changed in its location or is not constructed.

9.7.2   FACILITY PLAN FOR LEVEL-2 WATER SUPPLY SCHEME

(1) Facility Plan

The Level-2 water supply scheme pumps up groundwater by a deep well and distributes water at the public water points through the elevated distribution tank by gravity.   Each water supply scheme has one (1) distribution tank and no additional pump or tank is constructed in the transmission and distribution lines.   Treatment system is not constructed.   The facility plan is shown in Figure 9.7.1.
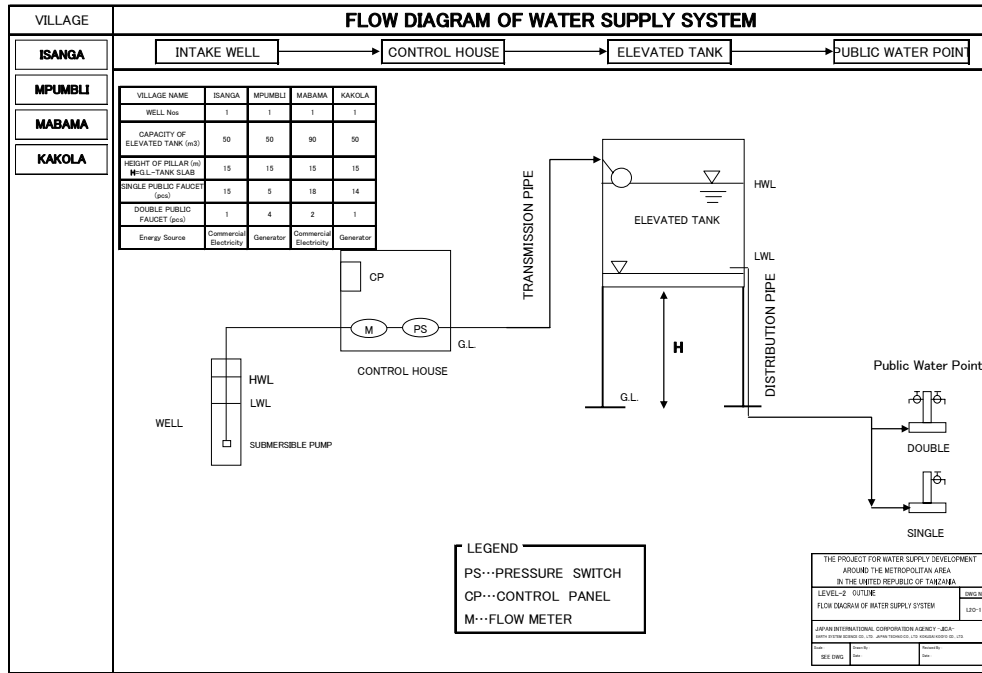
Figure 9.7.1 Framework of Level-2 Water Supply Scheme

(2) Water Source

1) Intake Facility

(i) Deep well

The water source is groundwater, and it is pumped up by a deep well. The water sources for the Level-2 schemes were already drilled in the test well drilling. Those wells are now properly protected up to the commencement of the implementation. The specifications of the deep wells are shown in Table 9.7.3.

Table 9.7.3 Specification of Deep Wells

	Level-2	Level-1	
		Type-A	Type-B
Type	-	Type-A	Type-B
Target area	-	District other than Sikonge	Sikonge District
Drilling method			
- Sediments	(already drilled)	Mud-rotary method	
- Granite, Gneiss (hard rock)		Down-the-Hole method	
Drilling depth	75～125 m	90 m in average	150 m in average
Drilling diameter	8 inches	7-5/8 inches	
Diameter of casing	6 inches	4 inches	
Material of casing/screen pipe	uPVC	uPVC	
Opening ratio of screen pipe	4%	4%	
Pumping method	Submesible pump	Hand pump	

The annular space between the wall of the borehole and casing/screen pipe is packed by gravel. The space on the gravel packing is filled by cement milk to prevent deterioration by surface water. The structure of the deep wells is shown in Figure 9.7.7 (page 9-17).

(ii) Pumping rate

The pumping rate of each well for the Level-2 schemes is shown in Table 9.7.2 (page 9-7).

(iii) Water quality

The water quality of the water source is evaluated applying the WHO Guidelines (2008) for the items related to health significance except for Fluoride, and the Tanzania Health Standard (2008) for other items and Fluoride.

Fluoride content was initially planned to be evaluated applying the WHO Guidelines.   However, the Fluoride contents of many test wells were more than the WHO Guidelines and within the Tanzania Health Standard.   The community people will be obliged to continue using deteriorated traditional water sources if that groundwater is not used as the water source due to high contents of Fluoride. Therefore, MoW requested JICA to change the standard for evaluation of Fluoride content from the WHO Guidelines to the Tanzania Health Standard in the Project.   JICA accepted this request providing that the community people in such villages were informed of the possibility to cause fluorosis, mitigation measures should be taken to reduce exposure of Fluoride and proper standard for Fluoride content would be set in the future.

2)   Control House

A control house is constructed next to the water source (deep well), in which a control panel for the diesel engine generator and submersible pump is stored.   The structure of the control house is block masonry considering the local construction conditions and easier construction methods.   Pumping of water is automatically controlled by setting a float valve in the distribution and a pressure sensor in the control house.

A ventilating duct is provided to evacuate exhaust gas from the diesel engine.

A commercial power supply is introduced in Isanga village, Nzega District and Mabama Village, Tabora Rural District.   The diesel engine generator is used in Mpumbuli Village, the Tabora Rural district and Kakola Village, Tabora Municipality.   One (1) diesel engine generator is provided in Isanga and Mabama villages respectively for the auxiliary power source in case of electric power failure.

(3)   Distribution Tank

The height of the distribution tank was set at 15m considering the topographical conditions of the project sites.   The capacity of each tank is basically half of the daily maximum flow, but it was set as 50m^3 at Isanga, Mpumbuli and Kakola, and 90m^3 at Mabama for effective construction work.

(4)   Pipeline

The High Density Polyethylene (HDPE) pipe was used for small diameter pipes (outer diameter less than 50mm) and the PVC pipe for larger diameters from 63 to 160mm.   Pipes are laid manually along the road with a 1 to 3m distance from both sides of the road.   However, if it is difficult due to natural or artificial conditions, the pipes may be laid under the roads.   The laying depth (from ground surface to the top of the pipes) is at least 90m.   Pipes are laid in the sand bed for protection: the sand bed covers up to 10cm above the top of the pipes.   In crossing the roads or laying under the roads, the pipes are laid at a depth of more than 1.2m.

Pipes are laid at a depth of 1.2m for crossing of small water flow of streams or channels and pipes are protected by concrete.

In case of crossing of a railway, pipes are laid in the sleeve pipes installed by pipe jacking method (horizontal drilling) under the railway.   The material of the sleeve pipe is HDPE.   The diameter is 300mm (2 sites) at Mabama and 200mm (1 site) at Kakola.

The valves such as gate valve, air valve and blowoff valve are properly installed following the Design Manual or the Japanese Design Standard for Waterworks Facilities.   T-tube and bend

pipes are properly protected by concrete blocks.

(5)   Public Water Point

Public water points are provided basically within 400m from residences for 150 to 250 persons taking the surrounding environment (school, dispensary, etc.) into technical consideration.   The intentions of the community people were also considered.   One (1) (type 1) or two (2) (type 2) taps are installed at each public water point.   The type 1 supplies 250 persons maximum and type 2 to more than 250 persons.   Table 9.7.4 shows the number of public water points in each village.

Table 9.7.4   Number of Public Water Point in each Village

Village	Type 1	Type 2
Isanga	15	1
Mpumbuli	8	1
Mabama	16	4
Kakola	12	2

A water flow meter is installed before each public water point considering the collection of water tariffs.   A drain is constructed at each public water point.

9.7.3   FACILITY PLAN FOR LEVEL-1 WATER SUPPLY SCHEME

The Level-1 water supply schemes of which water source is groundwater distributes water at the point water source installed on the deep well.   The number of Level-1 water supply schemes planned is 114 as shown in Table 9.2.1 (page 9-1).   The framework of the Level-1 is shown in Figure 9.7.2.
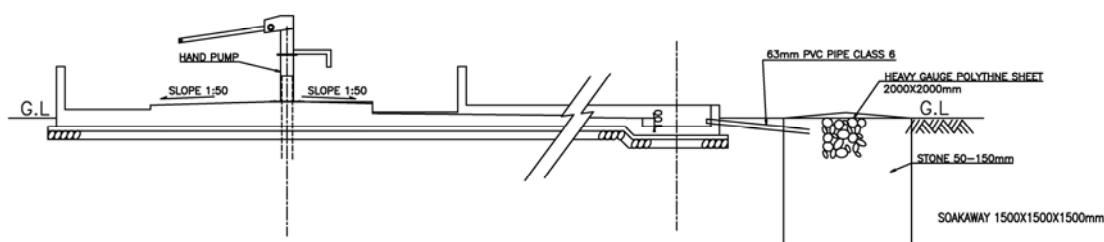
Figure 9.7.2   Framework of Level-1 Water Supply Scheme

Criteria for successful wells for the Level-1 schemes are as follows:

The maximum population served by a Level-1 scheme is 250 persons.   As the Tabora area is a difficult area in development of groundwater, a deep well with the yield of 0.4 m^3/hour is considered a successful well, because the minimum yield to pump by a hand pump is 0.4 m^3/hour. The well satisfies this criteria, water quality of such a well is analyzed in the laboratory.   If water quality satisfies the standards, the well is evaluated as a successful well.   Standards to be applied are the same as those for Level-2 schemes.

About 15.6 hours of pumping is required to supply water to 250 persons if the yield is 0.4 m^3/hour. If the yield is 0.5 m^3/hour, the pumping hours are reduced to 12.5 hours.   Since it is difficult to construct additional wells exceeding the planned number of wells in the village, no additional well is constructed even if the water demand of the village is not satisfied.

9.7.4   OUTLINE DESIGN DRAWING

The outline design drawings to be constructed in the Project are as follows:

(1)   Layout Plan of Level-2 Water Supply Schemes in each Village (Figure 9.7.3 to 9.7.6)

(2)   Deep Well Structure for Level-2 and Level-1 Water Supply Schemes (Figure 9.7.7)
(3)   Structure of Transmission and Distribution Pipelines (Figure 9.7.8)
(4)   Structure of Distribution Tank (Figure 9.7.9)
(5)   Structure of Public Water Point (Figure 9.7.10)
(6)   Structure of Level-1 Water Supply Schemes (Level-1) (Figure 9.7.11)
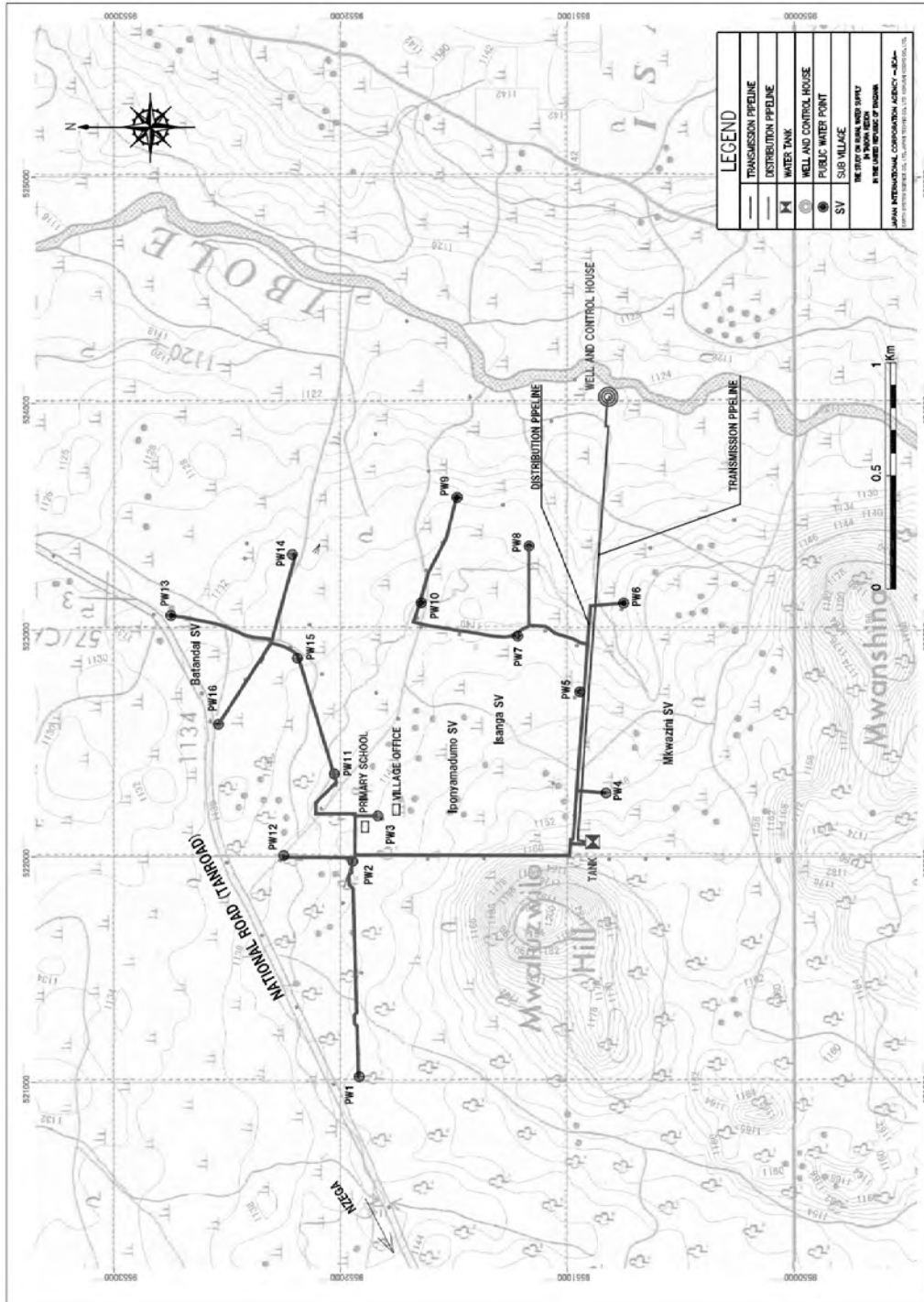
Figure 9.7.3   Layout Plan of Isanga Village, Nzega District
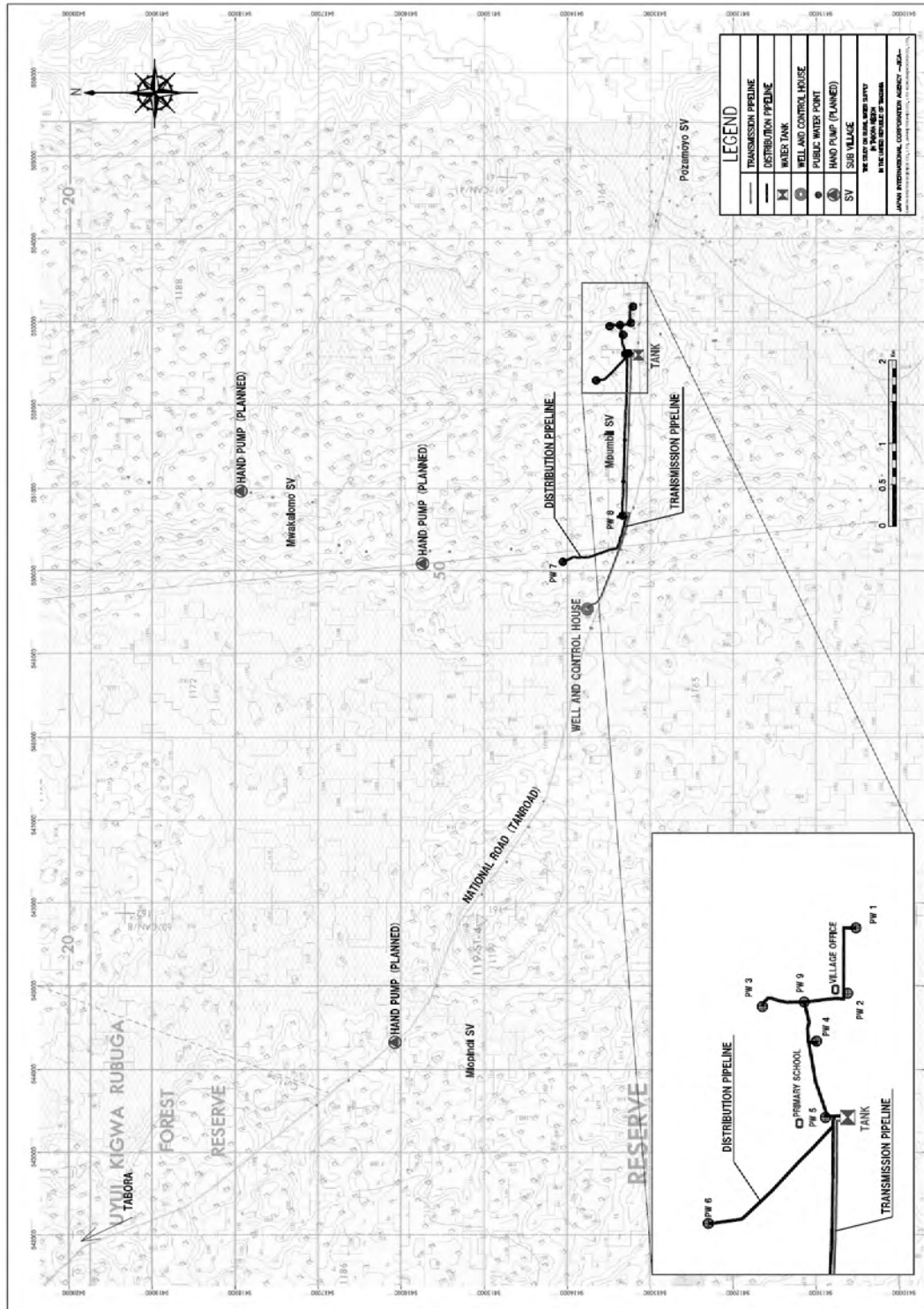
Figure 9.7.4   Layout Plan of Mpumbuli Village, Tabora Rural District

Figure 9.7.5   Layout Plan of Mabama Village, Tabora Rural District
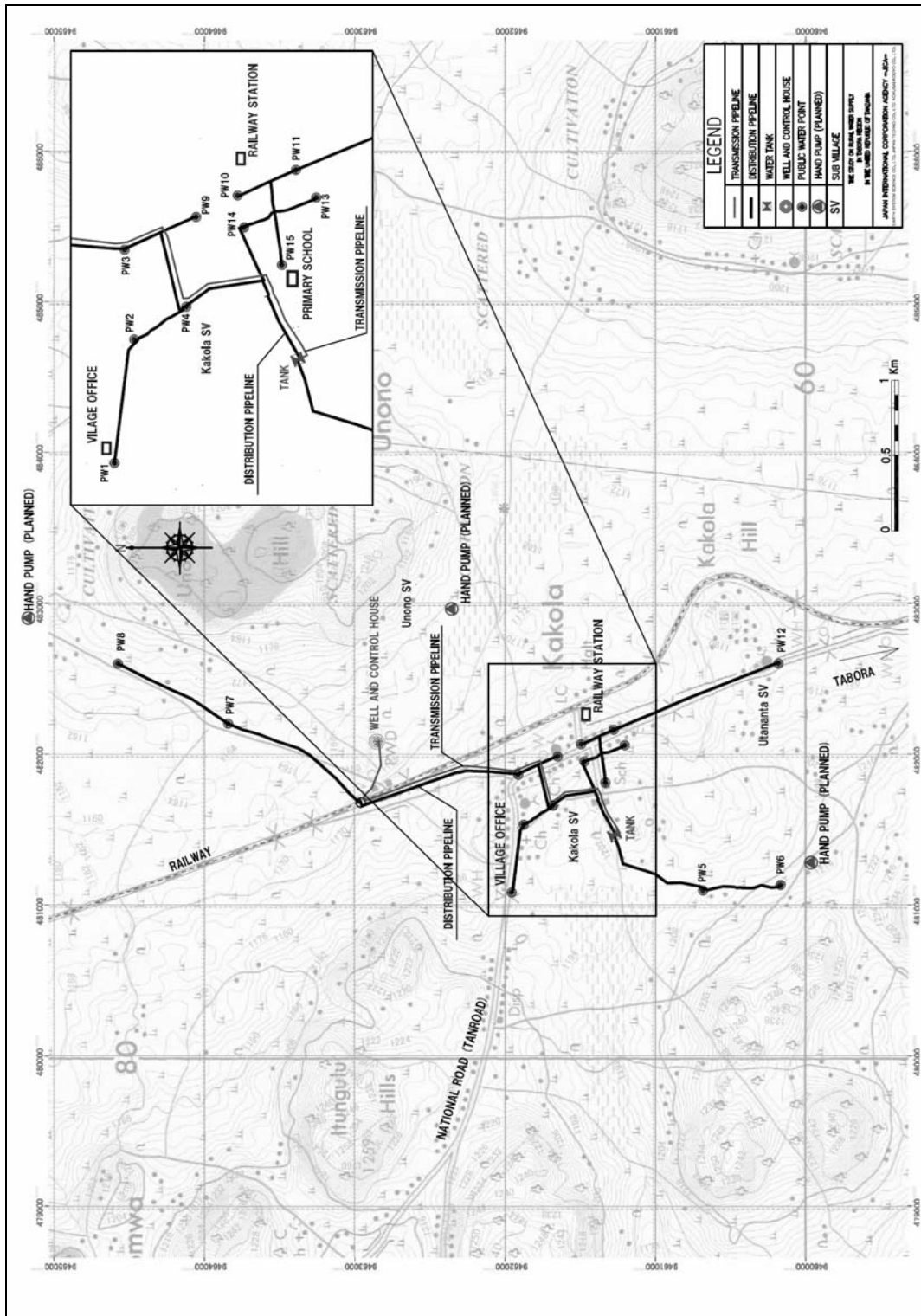
Figure 9.7.6 Layout Plan of Kakola Village, Tabora Municipality
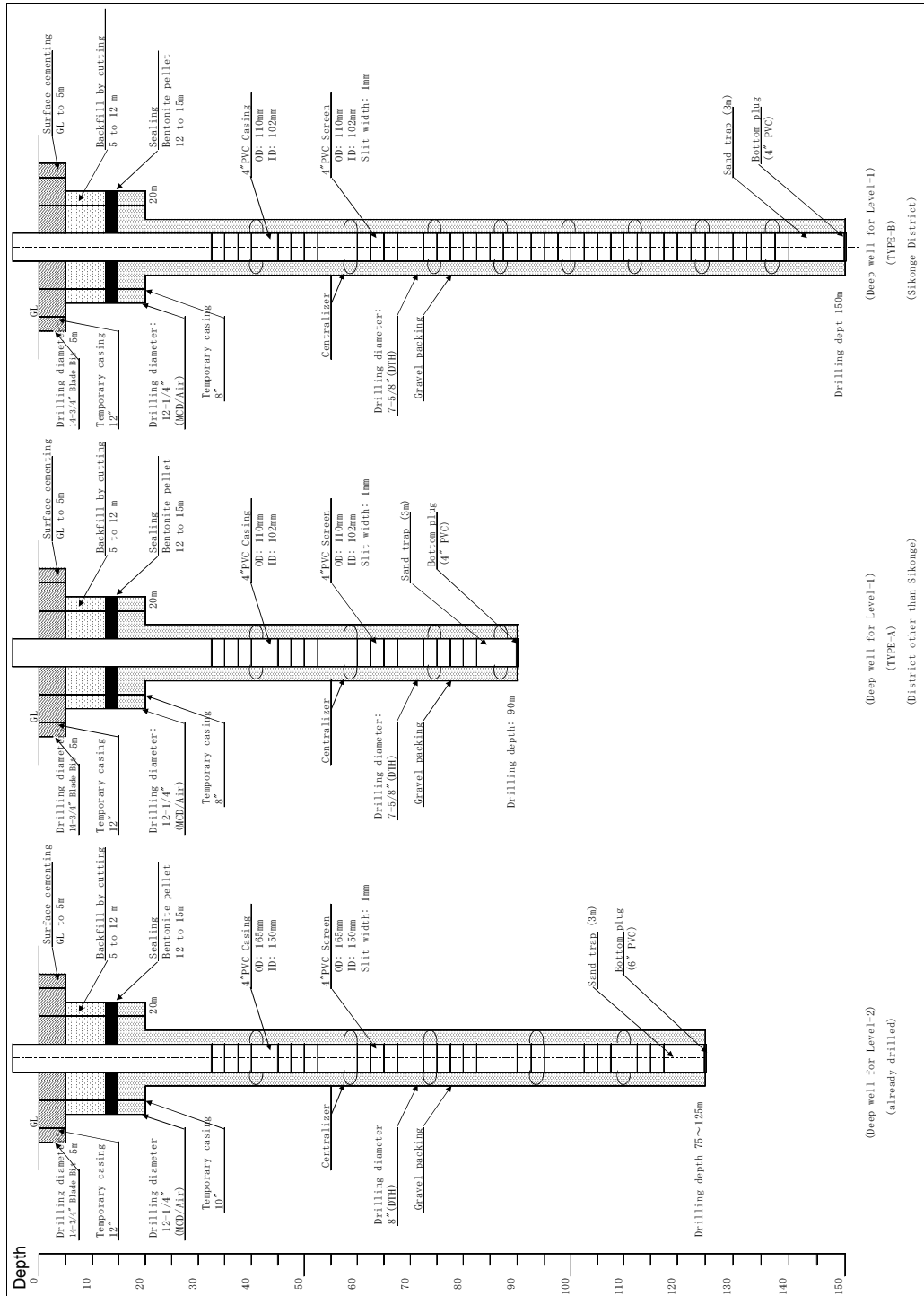
Figure 9.7.7   Well Structure of Deep Well for Level-2 and Level-1 Schemes
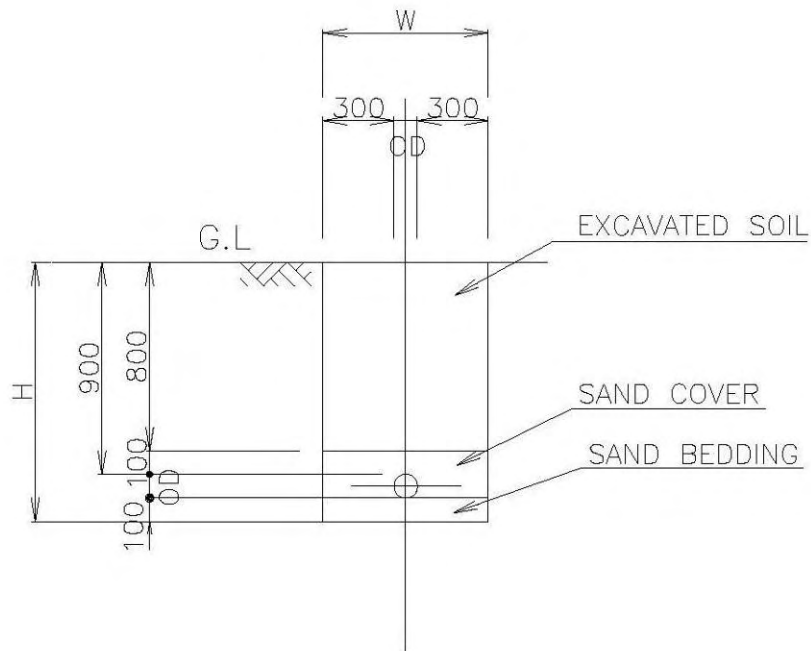
DIMENSIONS TABLE OF STANDRD PIPE LAYING

OUTSIDE DIA(mm)	W (mm)	H (mm)
32	650	1050
40	650	1050
50	650	1050
63	700	1100
90	700	1150
110	750	1200
160	800	1200
200	800	1200

FIGURE 9.7.8   Structure of Transmission and Distribution Pipelines

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ELEVATED TANK SECTION
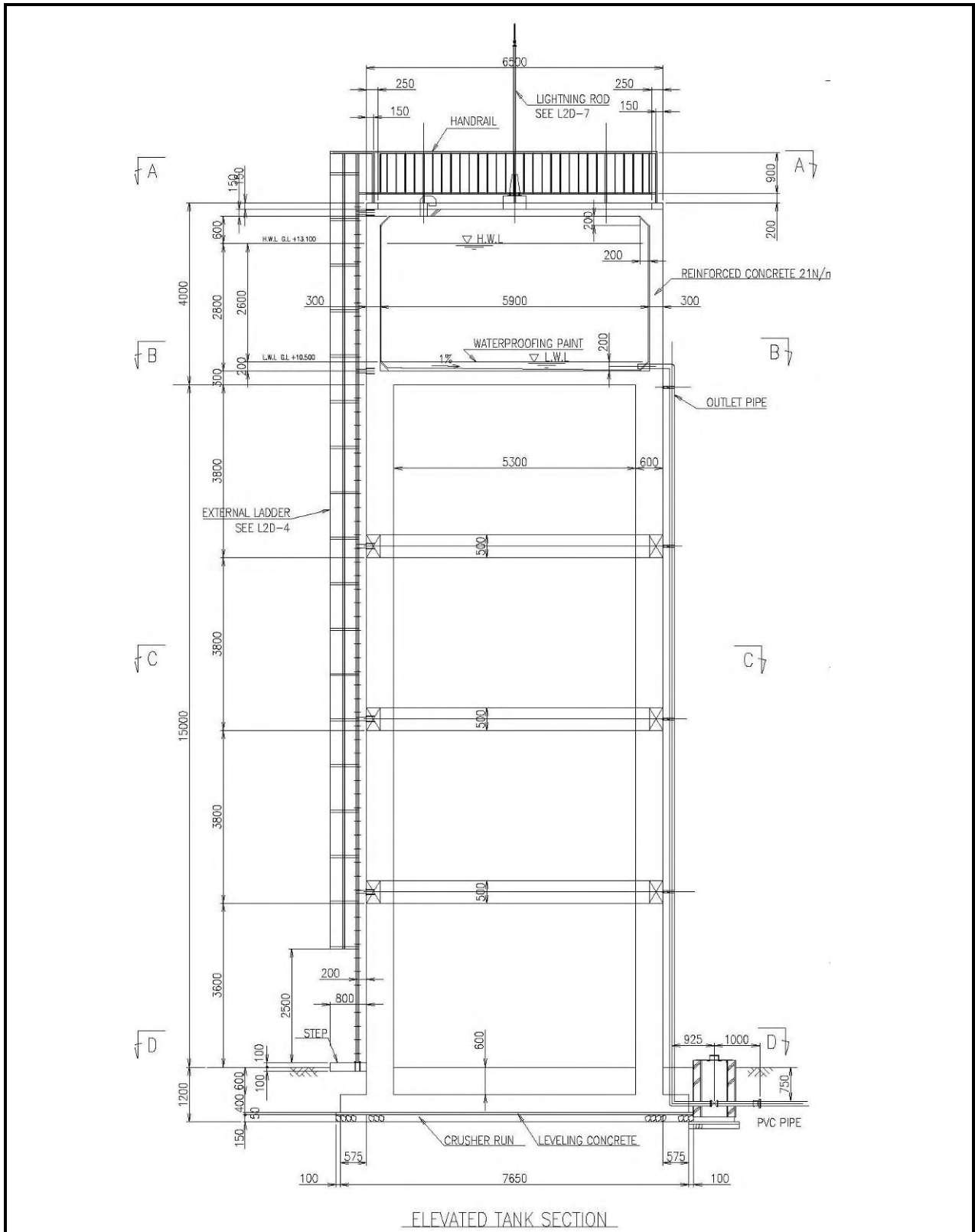
FIGURE 9.7.9   Structure of Distribution Tank

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Type 1 (1 taps)

Type 2 (2 tap)
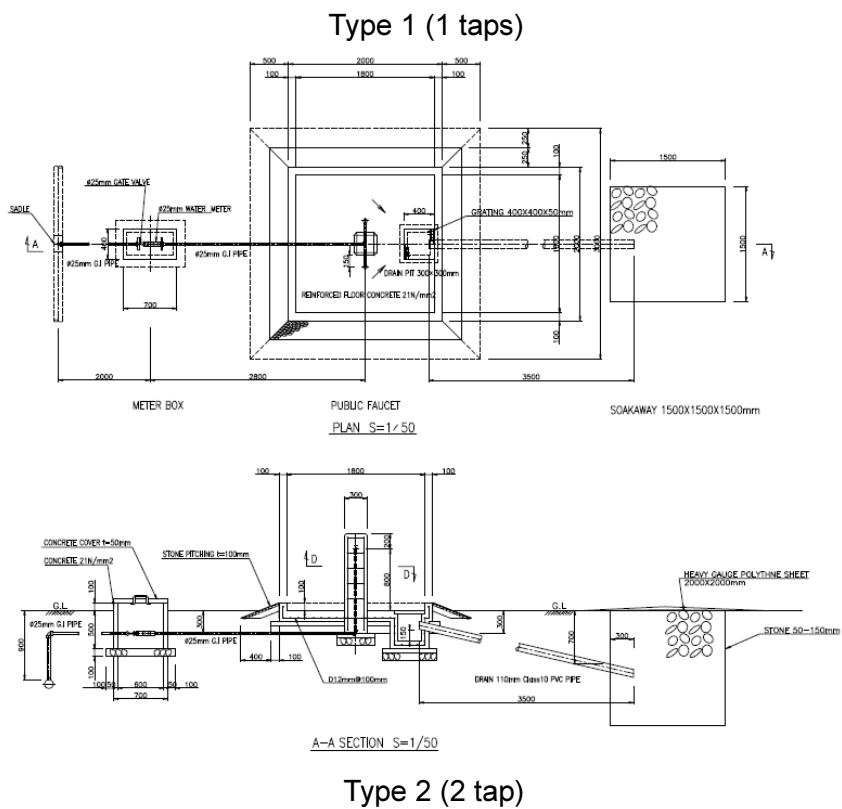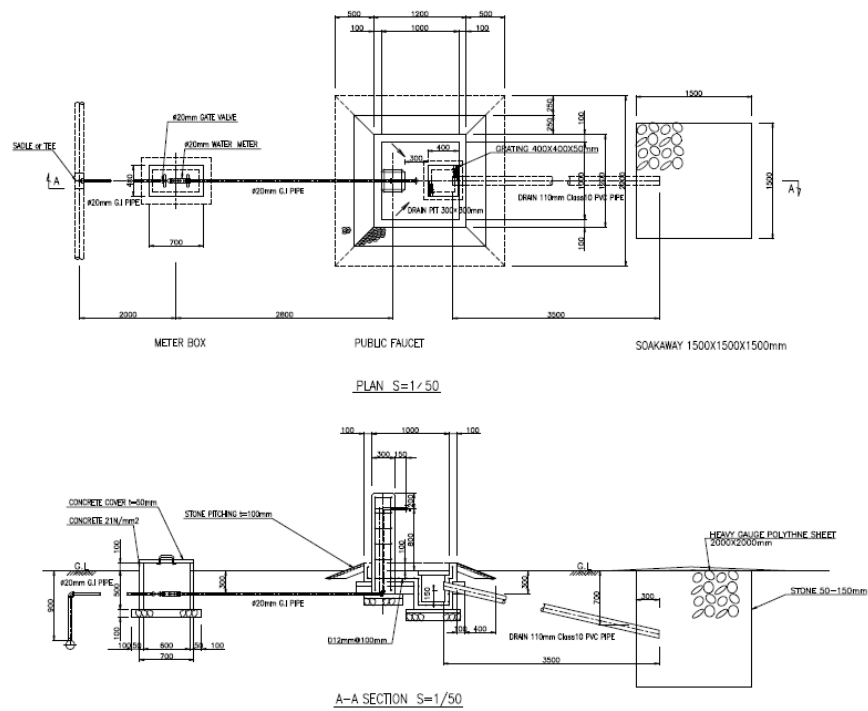
FIGURE 9.7.10   Structure of Public Water Point

HAND PUMP

SLAB CNCRETE 21N/mm2

12-1/4" DRILLING

10" CASING PIPE

CEMENT GROUT

10～20m

S.W.L

D.W.L

DRILL HOLE ⌀7-5/8" DTH
DRILL HOLE ⌀8-1/2"
MUD CIRCULATION

4" SCREEN PIPE (uPVC)

GRAVEL PACKING

⌀4" CASING PIPE (uPVC)

BACK-FILL

BOTTOM PLUG

TYPE-A: 80m
TYPE-B:150m
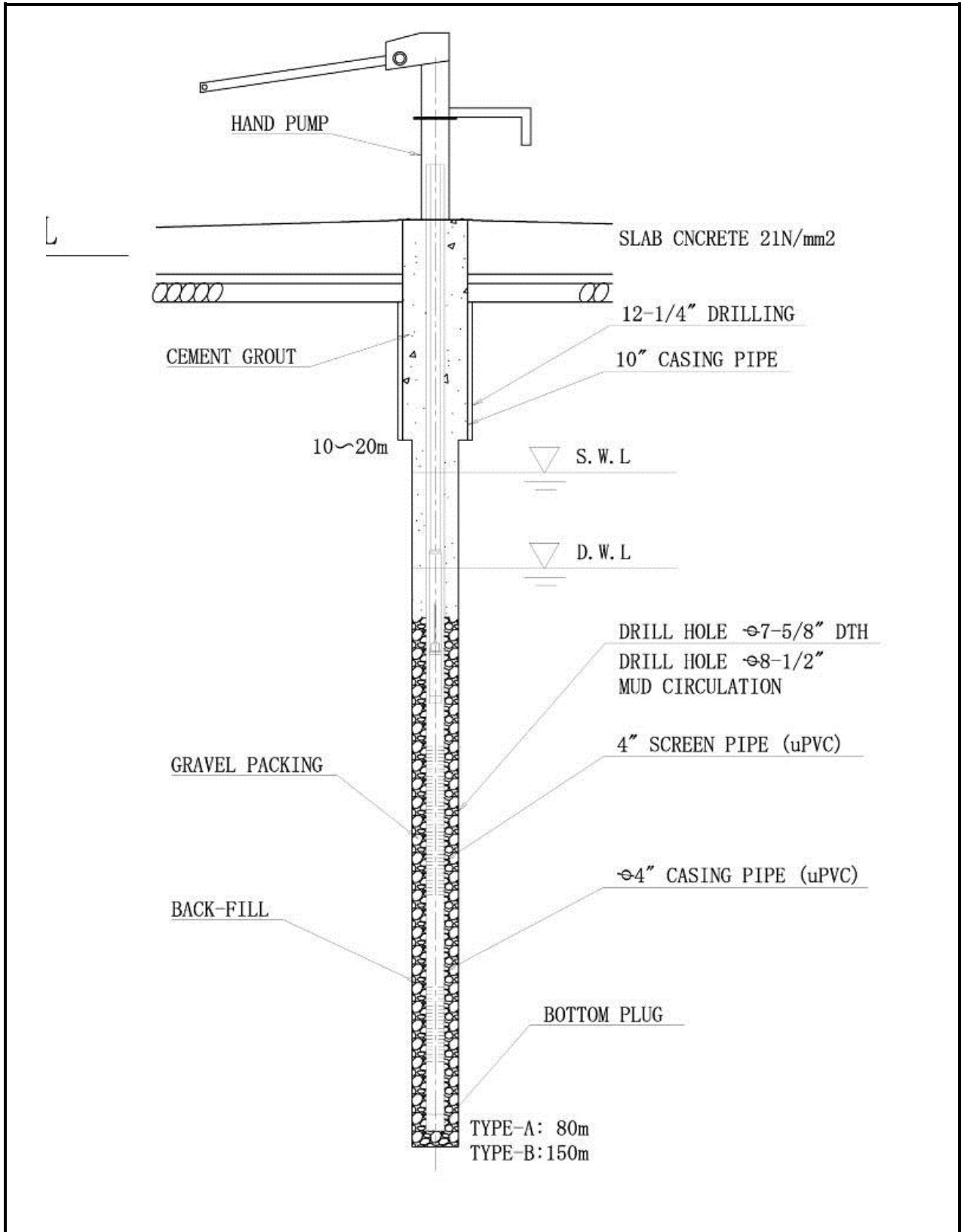
FIGURE 9.7.11   Structure of Deep Well with Hand Pump (Level-1)

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9.8   IMPLEMENTATION AND PLAN

9.8.1   IMPLEMENTATION POLICY

The main contractor of construction of water supply facilities designed in the Study shall be a Japanese contractor.

Construction work is composed of deep well drilling, construction of distribution tank, laying out of transmission/distribution lines, construction of public water points and installation of the handpump. These works are carried out by local contractor(s) under the supervision by the Japanese contractor.

The implementation agency of the Project is Ministry of Water (MoW), Tanzania.   Keeping a close relationship with MoW is required in the construction period.   In addition, District/Municipal Water Engineer's Office should be involved in order for smooth implementation during the construction work Materials and machinery to be applied in the construction work should be that possible to be procured in Tanzania considering well maintenance of the water supply facilities.

(1)   Temporary Works of the Sites

A 20m x 20m area of land is required adjacent to the control house and the distribution tank site as a storage site for materials, installation site of a concrete mixer, panel processing site.   A 20m x 30m area as a storage site for pipes and site cabin should be prepared along the main road.

The site for the field office should be also provided.

(2)   Inland Transportation of Materials

In the construction works of the Level-1 schemes, heavy vehicles such as drilling rigs and long body trucks will pass to the drilling sites.   Therefore, clearing of bush and maintenance of access roads are required.

In case of the construction works of the Level-2 schemes, it is difficult to pass heavy vehicles (10 tons) to the sites.   Materials will be carried by heavy vehicles to the field office and to the sites by 4 tons of trucks.   Therefore, 4 ton trucks with a crane and 4 ton dump trucks should be allocated to each field office.

(3)   Installation Work of Pipelines

A 5m width of land for installation of pipelines is required along the pipeline routes considering the width of the trench to be drilled and temporary storage of excavated materials.   Excavation work will be done by manually if the access roads will not allow heavy duty trucks to pass to the sites due to their width.

(4)   Construction Work of Distribution Tanks

Concrete will be gestated by mixer at the site because it is impossible to use freshly mixed concrete. Placement of concrete will be done manually or by crane.

(5)   Drilling Work of Deep Wells for Level-1 Scheme

A 30m x 30m area of land is required close to the drilling site for a storage site of drilling rig, compressor, water tank lorry, trucks, drilling pipes, drilling tools, casing pipes, cement and ballast in the drilling work of deep wells for the Level-1 scheme.

9.8.2   IMPLEMENTATION CONDITIONS

(1) Access to the Sites

Roads in the Tabora Region are not paved except for the section between Tabora Municipality and Nzega Town and the city area of Tabora Municipality.   The width of access roads to the sites is

sometimes narrow, about 3m in width, so that it is difficult for heavy vehicles to pass through the roads.

Access in the dry season is not a problem; however, it becomes very bad in the rainy season (October to May) in many villages.   Therefore, construction work in such villages should be done in the dry season.

(2) Safety of the Site

Since installation work of pipelines will be done along the roads in service, signboards and security facilities will be provided at the working site.   In addition, a person for traffic control will be allocated to each site.

9.8.3 SCOPE OF WORK

Scope of works is divided by both governments, Tanzania and Japan, as shown in Table 9.8.1.

Table 9.8.1   Scope of Work for the Tanzanian and Japanese Government

Construction Works	Japanese side	Tanzanian side
1. Construction of Intake		
1.1 Acquisition of land		○
1.2 Provision of land for temporary works		○
1.3 Provision of access road		○
1.4 Construction of intake structure	○	
1.5 Road construction in the site	○	
1.6 Construction of fence and gate	○	
1.7 Construction of branch power line to the site	○	
2. Pipe Laying Work for Transmission and Distribution Lines	○	
2.1 Land acquisition		○
2.2 Provision of access road		○
2-3 Pipe laying work	○	
3. Construction of Distribution Tank		
3.1 Land acquisition		○
3.2 Provision of access road		○
3.3 Construction of distribution tank	○	
3.4 Road construction in the site	○	
3.5 Placing fence and gate	○	
3.6 Construction of drainage canal		○
4. Construction of public water point		
4.1 Land acquisition		○
4.2 Construction of public water point	○	
4.3 Construction of drainage canal	○	

9.8.4 CONSULTANT SUPERVISION

(1) Implementation System of Construction Works

The project is implemented under the Japan's Grant Aid Assistance scheme based on the conditions described in the Exchange of Note (E/N) which will be concluded between the Tanzanian Government and the Japanese Government.   The implementation agency in Tanzania is the

Ministry of Water (MoW).   CWSD is responsible organization for technical issues in MoW. Supervision and inspection of the construction works are carried out by CWSD.

A Japanese consultant will be employed by MoW for services of the detailed design study, preparation of tender documents, assistance in the tendering process and construction supervision. In the construction stage, the Japanese consultant supervises the construction works as well as reports to and discusses with the Embassy of Japan and the JICA Office.

Conceptual structure for the project implementation is shown in Figure 9.8.1.
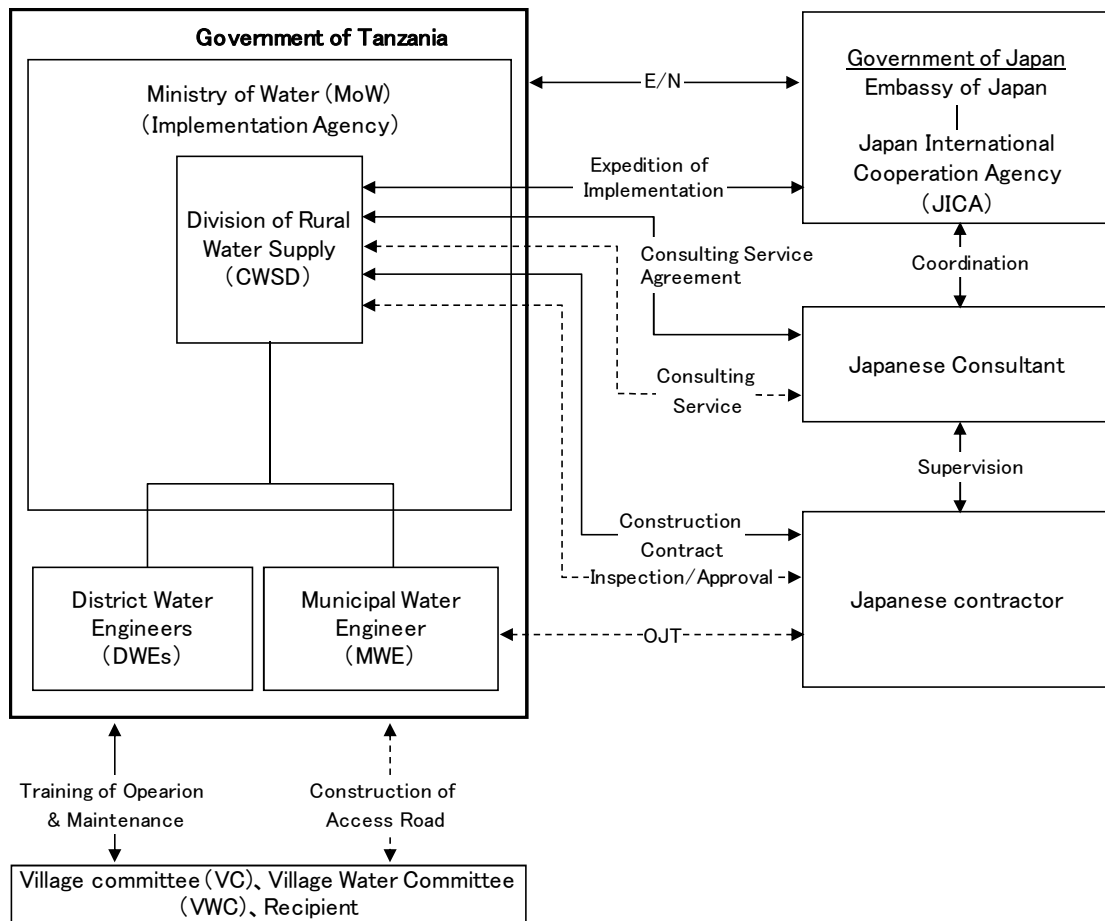
Figure 9.8.1   Conceptual Structure for the Project Implementation

9.8.5   IMPLEMENTATION SCHEDULE

The schedule of implementation of the project is shown in Table 9.8.2.   Implementation of the Project will start from the Detailed Design Study and will be end with completion of the water supply schemes.   The total period is about 36 months.

Table 9.8.2 Implementation Schedule of the Project

Month	1	2	3	4	5	6	7	8	9	10	11	12
Detailed Design		Filed Survey										
			Work in Japan									
					Preparation of Tender Doc.							
Construction Level-1		Preparation Work										
						Drilling of Deep Well						
							Construction of Superstructure					
Construction Level-2		Preparation Work										
			Construction of Intake									
						Construction of Distribution Tank						
					Laying out of Transmission/Distribution Lines							
Procurement		Fabrication & Transportation										

Month	13	14	15	16	17	18	19	20	21	22	23	24
Construction Level-1	Drilling of Deep Well											
	Construction of Superstructure											
Construction Level-2		Construction of Intake										
					Construction of Distribution Tank							
	Laying out of Transmission/Distribution Lines											

Month	25	26	27	28	29	30	31	32	33	34	35	36
Construction Level-1	← (Construction of Superstructure)											
	Delivery											
Construction Level-2	Delivery											

9.9 OPERATION AND MAINTENANCE COST

Operation and maintenance costs for the Level-2 and Level-1 water supply schemes were estimated as shown in Table 9.9.1.

Table 9.9.1 Operation and Maintenance Costs for Level-2 and Level-1

Type	Village	O&M Cost/Year (x10^3 Tsh)	O&M Cost /household/month (Tsh)
Level-2	Isanga	24,208	6,498
	Mpumbuli	43,452	8,583
	Mabama	40,494	3,886
	Kakola	48,030	9,226
Level-1	Each scheme	841	1,765
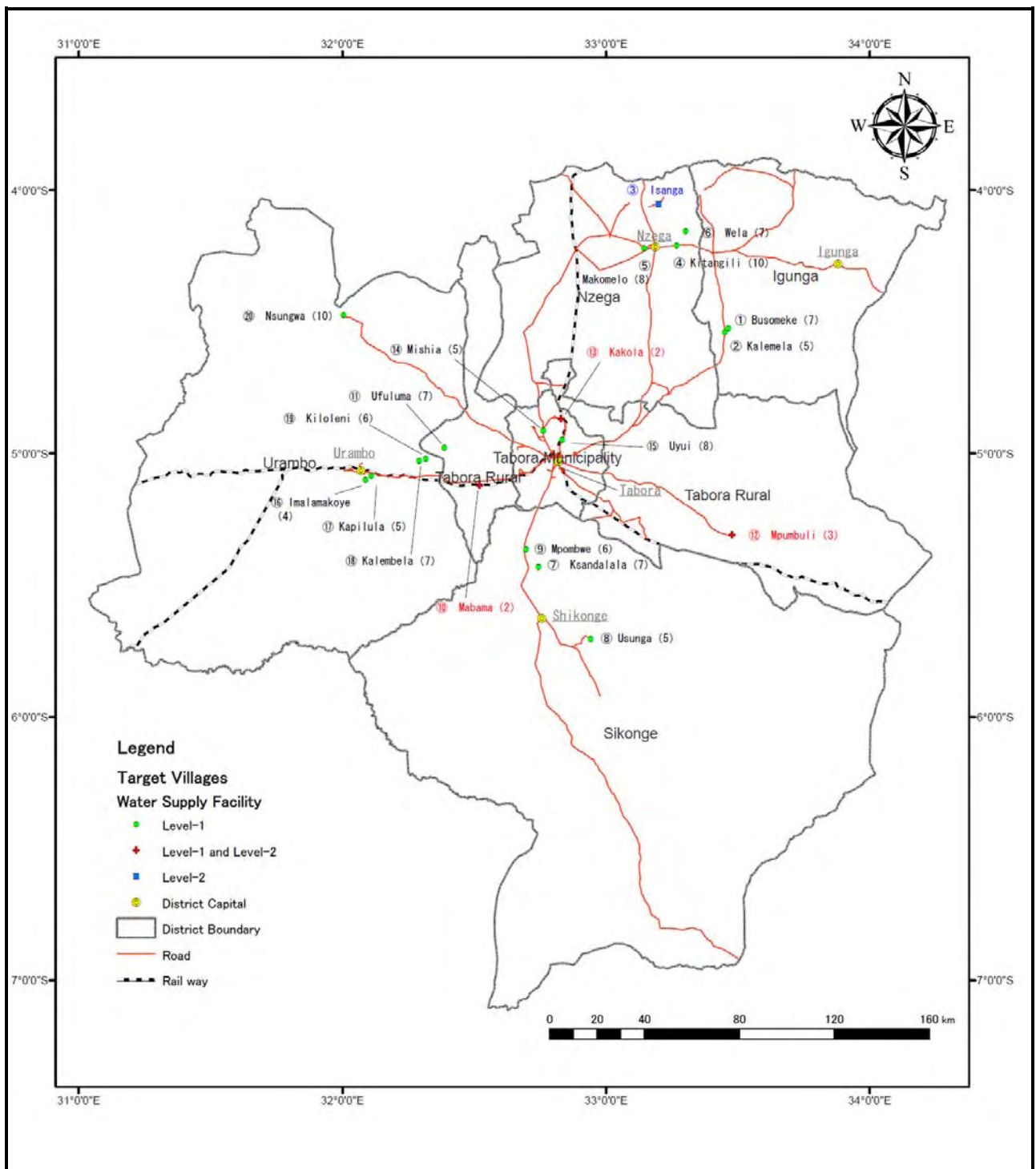
FIGURE 9.9.1   LOCATION OF PRIORITY VILLAGES

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CHAPTER 10   SOCIO-ECONOMY IN TARGET VILLAGES OF PRIORITY PROJECT

10.1 GENERAL

A detailed socio-economic survey (phase 2) was conducted in 20 priority villages in the Tabora Region. The purpose of the survey was to provide information on: i) priority villages for the study to formulate the Rural Water Supply Plan; ii) detailed socio-economic information on the priority villages; and iii) a health and sanitation plan of six (6) districts in the study area, which was necessary to formulate the rural water supply strategy.   The field study was contracted out to the local consultant, who was supervised by the JICA study team throughout the survey process.   The field survey lasted from September to October 2010 and was composed of one key informant interview with a village representative, and 15 samples household surveys (300 samples in a total of six districts) based on questionnaires provided by the JICA study team.   Data analysis was performed by the consultant.

10.2 TARGET VILLAGES

As stated in Table 10.2.1, 20 villages were selected for the priority project for preparing the Rural Water Supply Scheme.   They include two (2) villages of Igunga, four (4) villages of Nzega, three (3) villages of Sikonge, three (3) from Tabora Rural, three (3) from Tabora Municipality and five (5) from Urambo.

Table 10.2.1 List of Villages Where Field Survey Was Conducted

District/Municipality	Ward	Village	No. of Villages by District
Igunga District	Mwisi	Busomeke	2
	Mwisi	Kalemala	
Nzega District	Ijanija	Makomelo	4
	Lusu	Isanga	
	Miguwa	Kitangili	
	Wela	Wela	
Sikonge District	Igigwa	Kasandalala	3
	Kipanga	Usunga	
	Pangale	Mpombwe	
Tabora Rural District	Kizengi	Mpumbuli	3
	Mabama	Mabama	
	Ufuluma	Ufuluma	
Tabora Municipality	Kakola	Kakola	3
	Misha	Misha	
	Uyui	Uyui	
Urambo District	Imalamakoye	Imalamakoye	5
	Kapilula	Kapilula	
	Kiloleni	Kalembela	
	Kiloleni	Kiloleni	
	Uyowa	Nsungwa	
Total	-	-	20

10.3 SURVEY ITEMS

Tables 10.3.1 and 10.3.2 show the survey items.

Table 10.3.1   Survey Items for Key Informant Interviews

General information	Village and sub-village information
	GPS coordinates
	Information on the respondent
Village information	Population and households
Socio-economics	Main source of income
	Food crops and cash crops
Operation and maintenance of existing water supply facilities	Necessity of water facility
	Willingness to pay for new facility
	History of breakdown
	Practice of collecting user fees
	Financial management of water fund

Table 10.3.2   Survey Items for Household Interviews

General information	GPS coordinates
	Information on the respondent
	Information on the household
Health and sanitation (*Analysis and results are shown in chapter 8)	Medical history of family members
	Medical expenses
	Knowledge and behaviour about sanitation
Economic status of the household	Ownership of assets
	Materials for roofing and walls
	Household income and expenditure
	Annual cash income
	Possession of livestock
Women's activities	Role of fetching water and transportation means
	Washing premises
	Decision maker
Water use	Water source
	Time to fetch water
	Water consumption
	Satisfaction of water quality and quantity
Financing for water use	Current practice of payment for water
Valuation on the improved water supply	Required improvement to water scheme
	Responsibility of operation and maintenance
	Willingness to pay

10.4 OUTCOME OF THE SURVEY ON SOCIO-ECONOMIC CONDITIONS

10.4.1 OUTCOME OF THE PRIORITY PROJECT VILLAGES

(1) General information on respondents

In the household survey in the priority villages, the number of male respondents was 226 (75.3%), and female 74 (24.7%).   The average age of the respondents was 48.

In this survey, a household was defined as multiple persons who share economic resources within the same premises, i.e. house.   Both related and unrelated persons were included.

The median household size was seven (7) people.   According to the 2002 population and housing census (hereinafter the "census 2002"), issued by the National Bureau of Statistics, the mean household size was 5.9 in the Tabora Region.   Considering the large households in rural areas, no significant increase was identified compared with 2002.   In the survey, the number of people per household ranged from 1 to 24 people.

(2) Economics and Industry

As shown in Figure 10.4.1, the primary income source of the priority villages is agriculture (96.3%). Other income sources such as livestock raising (1.0%), waged income (1.0%), or small business (0.7%) are minor.   In Nsungwa village in Urambo District, there is a gold mine and workers work for wages. 67.3% of households have secondary income sources, which are commonly livestock keeping (38.1%), retail (33.7%), and casual labour (12.4%), respectively.
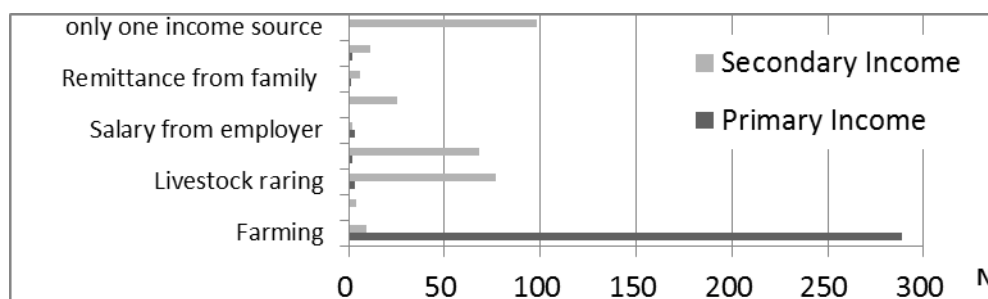
Figure 10.4.1   Income Source of Target Villages

As shown in Table 10.4.1, 45.3% of sample households kept livestock.   The mean number of livestock per household among livestock keepers was 23 cattles, 12 goats and 3 sheeps.   The abundance of households keeping livestock within rural villages of the Tabora Region, and the characteristics of the society are considered attributable to a combination of farmers and agro-pastoralists.

Table 10.4.1   Livestock No./Household

Livestock Keeper	Household No.	%	Variety	Mean	Max
Yes	136	45.3	Cattle	23	500
			Goat	12	69
			Sheep	3	20
No	164	54.7	-	-	-

Agriculture and livestock keeping are labour intensive jobs, in which children tend to be engaged. Boys (12.0%) and girls (12.8%) contribute to household economics as important labour.   The task of fetching water by girls, which will be mentioned later, may have a negative impact on children's education.

Households cultivate different types of cash crops in various parts of the Tabora Region.   In Urambo, Sikonge and Tabora Rural Districts, tobacco production is widespread and brings in reasonable cash income, although the districts are remote.   Horticulture is also an important cash source in Tabora Rural District for targeting the market in Tabora City.   Igunga and Urambo have less rainfall and produce crops such as rice, maize, groundnuts or cotton as their cash income.

(3) Ownership of Specified Assets

Ownership of assets, e.g. radios, mobile phones, and means of transportation, was surveyed to assess the poverty level in the rural part of the Tabora Region.   Radios were owned by 80.6% of households and commonly utilised as information sources (Figure 10.4.2).   According to the 2002 census, radio ownership was 39.2%, reflecting a significant improvement in the ownership rate. Mobile phones also became widespread in villagers' daily lives, owned by 70.0% of households (Figure 10.4.3).   Among the latter, 22.0% owned more than two (2) mobile phones, which signifies that the mobile phone is recognised as an individual piece of property rather than common property in households.   This high percentage of mobile phone coverage could be advantageous for the community as a means of communication in rural areas, where the poor road conditions

hamper physical transportation. As a means of transportation in households, as shown in Figure 10.4.4, 90.3% of households owned bicycles, which were the main source of transportation, followed by motorbikes (6.0%), and on foot (8%). In the 2002 census, ownership of bicycle was 39.4%, a rate which had also more than doubled.
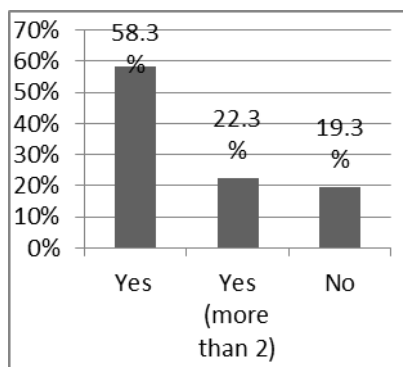
Figure 10.4.2   Ownership of Radios
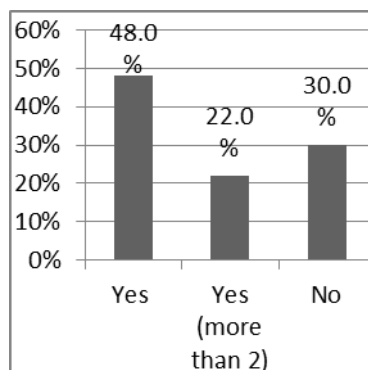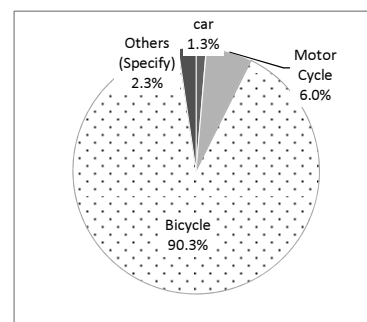

Figure 10.4.3   Ownership of Mobile Phones

Figure 10.4.4   Ownership of Means of Transportation

(4) Material for Roofs and Walls

Figure 10.4.5 below shows that straw thatched roofs were the most popular roofing materials accounting for 63.7%, followed by asbestos/iron sheeting for 36.0%. Only 10.9% of households used iron sheeting in rural areas in the 2002 Census. The results when assessing building materials for walls also reveal the same picture. In 2002, walls built of mud and wood accounted for 40.0%, but this fell to 18.7% in this survey (Figure 10.4.6). In contrast, the percentage of walls built of burnt bricks increased to 16.0% as opposed to just 0.8% in 2002. This improvement indicates steady development in the living environment in the rural area of the Tabora Region.
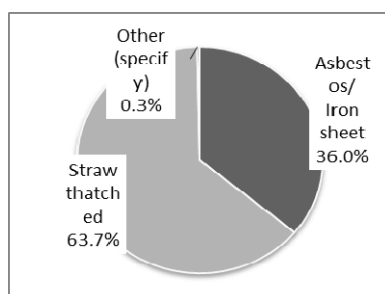
Figure 10.4.5   Building Materials for Roofing   **Figure 10.4.6   Building Materials for Walls**
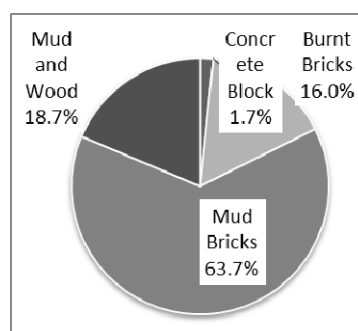
(5) Illiteracy Rate

A steady improvement also emerged in the illiteracy rate compared with the data of the 2002 census. As shown in Figures 10.4.7 to 10.4.9 below, the illiteracy rates for over 18-year-olds were 16.2% for males, 26.2% for females and 21.2% for both males and females in this study, as opposed to 47.0% for males, 58.0% for females and 53.0% for both males and females in 2002. These figures represent the interventions of governments, e.g. via PEDP, the Primary Education Development Programme, which has gradually reached rural areas in Tabora. The illiteracy rate among the younger generation might be even lower than the rates above. However, one in five persons still has trouble reading and writing. It is necessary to consider the illiterate when mobilising the community or providing training in operation and maintenance.
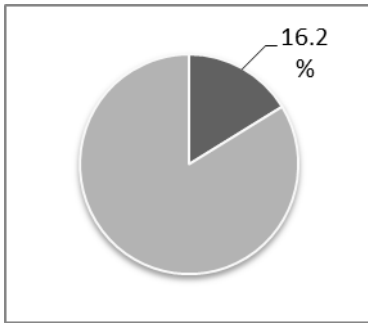
Figure 10.4.7 Illiteracy Rate of Adult Males
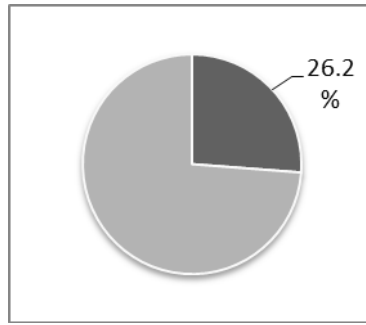
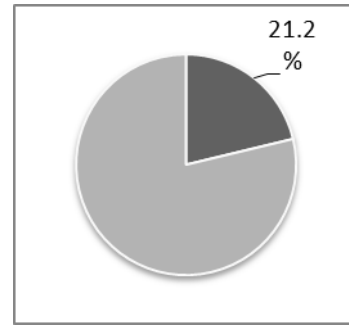**Figure 10.4.8 Illiteracy Rate of Adult Females**

Figure 10.4.9 Illiteracy Rate of both Males and Females

(6) Household Income

It is clear that the responsibility for O&M is handed over to the community after the construction of water supply schemes. Thus water tariffs should be borne by the community. As Level-2 requires a higher O&M cost compared with Level-1, the village's ability to pay water tariffs must be evaluated properly. If the villages do not meet certain conditions for collecting the water user fee, the water supply scheme must be changed to those with a lower O&M cost such as Level-1.

In the regions of Dar es Salaam, Coast, Lindi, Mtwara and four (4) regions in Central Plateau where grant aid water supply projects by the Government of Japan were implemented, one (1) Tsh/L is the general water use fee for a piped water supply scheme. According to a previous project, the operation and maintenance cost including the rehabilitation cost for a Level-2 water supply facility whose target population is more than 2,500, can be covered by 1 Tsh/L, with collection of fees from 80% of the population. Another condition is that the cost to be paid by the user community shall not exceed 5% of the household income. Based on these assumptions, information on the rural economy was collected in the field survey.

The median household income was categorised as 150,001 - 200,000 Tsh/month, with a share of 22.6%, followed by 200,001 - 300,000 Tsh/month comprising 16.9% (Figure 10.4.10). The Budget Household Survey conducted by the National Bureau of Statistics (NBS) in 2000/01 showed the average monthly income in the rural area of the Tabora Region to be 9,582 Tsh/person. The applied annual inflation rate is estimated as 121,204 Tsh/household, which means the income earned in the survey is slightly above average.

Differences among districts reveal Urambo as the wealthiest district with 200,001 - 300,000 Tsh/month, followed by Igunga, Tabora Rural and Tabora Municipality with 150,001 - 200,000 Tsh/month, and Nzega and Sikonge with 60,001 - 100,000 Tsh/month, respectively.

As mentioned in the previous section, most households depend on agriculture, which means that cash income is only available during the harvest season of May to August, as shown in Figure 10.4.11.
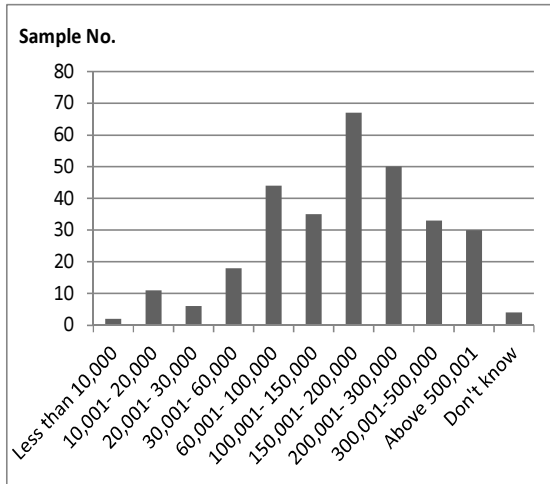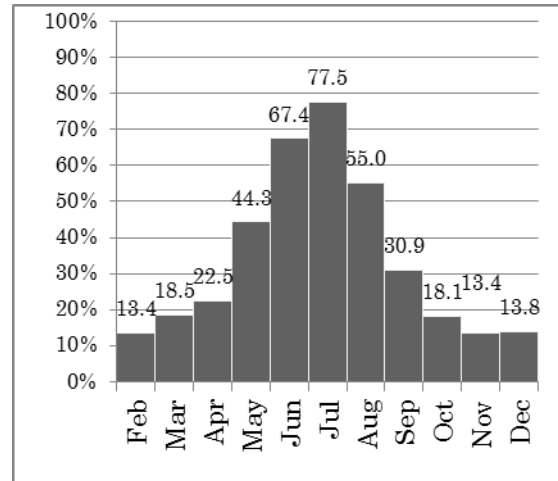
Figure 10.4.10   Monthly Household Income

Figure 10.4.11   Month of Income

The median household expenditure was 120,000 Tsh/Month.   Average monthly expenditure based on NBS was 8,450 Tsh/person.   The equivalent figure considering inflation rate is 106,884 Tsh/household which is reasonable value.

Differences among districts reveal Urambo again as the wealthiest district with 210,000 Tsh/month, followed by Igunga and Tabora Municipality with 150,000, and Tabora Rural with 122,500 Tsh/month, and Nzega and Sikonge with 300,000 Tsh/month, respectively.   Average expenditure per villages is shown in Figure 10.4.12.

Considering income and expenditure, economic status are differed in districts, Urambo is wealthier than average, Igunga, Tabora Rural, and Tabora Municipality are on average, and Nzega and Sikonge is slightly poorer than average.
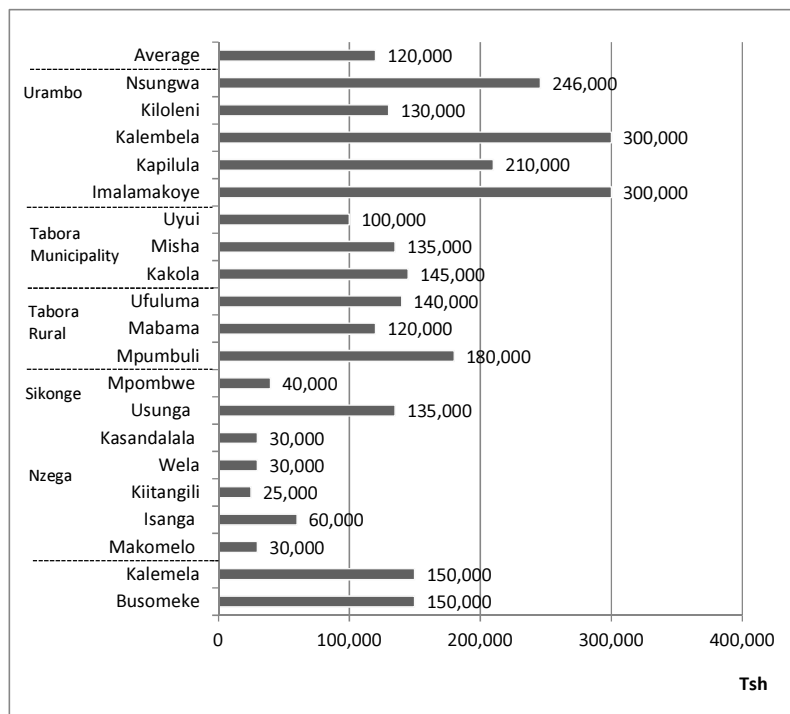
Figure 10.4.12   Mean Household Expenditure(Tsh/Household/Month)

10.4.2 COMMUNITY BASED ACTIVITIES

(1) Community Based Organization

Community-based organizations exist in 13 priority villages out of the total 20. The remaining seven villages have no particular organisations. Common types of organizations are farmers' associations and women's groups, which operate in 11 villages (Figure 10.4.13).
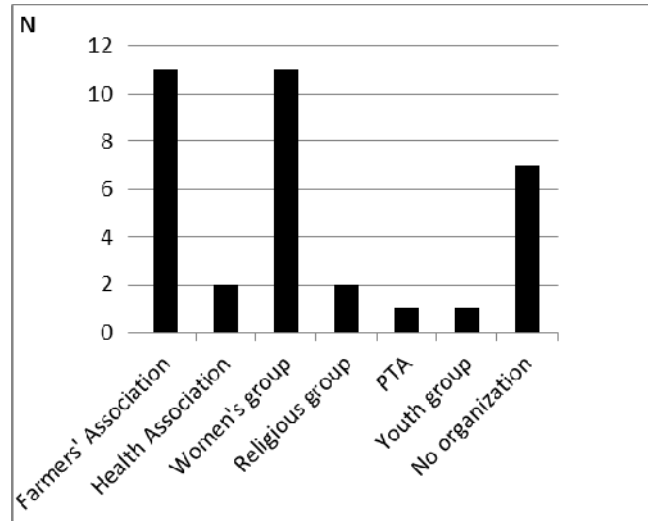

Figure 10.4.13   Types of Community-Based Organisations

(2) Communal Activities

Figure 10.4.14 below shows that 19 villages have experienced communal activities and only Kakola village stated that no such activities had taken place. Common activities implemented by the villagers included construction of primary schools (15 villages), maintenance and improvement of roads (15 villages) and construction of water facilities (14 villages). Most of these villages have provided funds, materials and labour to construct water facilities. Some households answered that the community tried to excavate for a water facility on its own, but was unable to reach the water source.
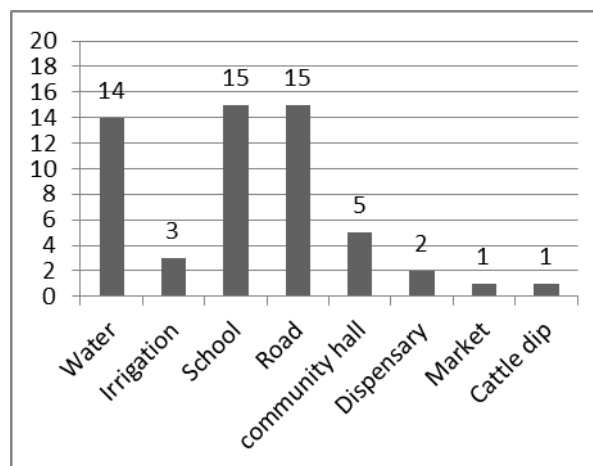

Figure 10.4.14   Experience of Communal Activities

The kinds of contribution for communal activities are shown in Figure 10.4.15. Cash contributions towards the initial investment cost and provision of labour force were common contributions by villagers. Cash and in-kind contributions for community development are not new concepts to most villages. If community members recognise its necessity, cash payment itself will not be a new issue for the villagers.
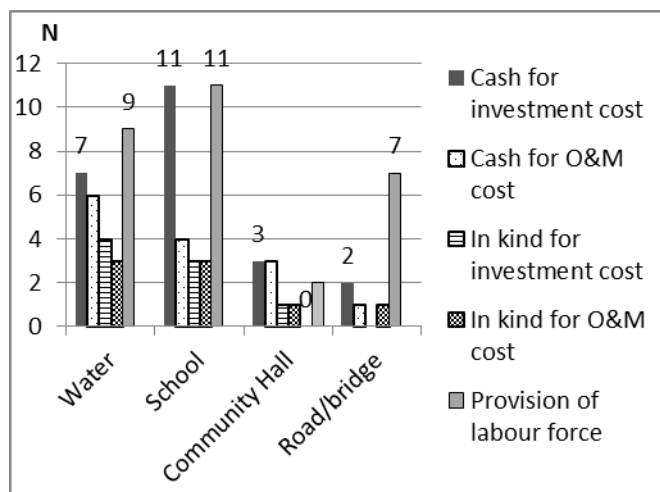
Figure 10.4.15   Type of Contribution for Communal Activities

10.4.3   RESPONSIBILITY OF WOMEN'S ACTIVITIES

(1)   Role of Fetching Water and its Means

As shown in Figure 10.4.16, fetching water is primarily work for adult women (93.3%).   A minority of males (3.3%) take charge of the task.

As a secondary role, girls (66.7%) and boys (16.7%) are responsible for fetching water.   As shown in Figure 10.4.17, water is fetched on foot by more than 60% of women, while 30% are allowed to use a bicycle.   Considering the time taken to fetch water and the means involved, water collection represents a major burden for women and limits women's opportunities in economic activities and other engagements.
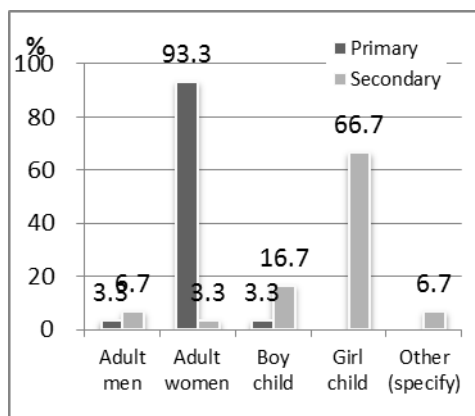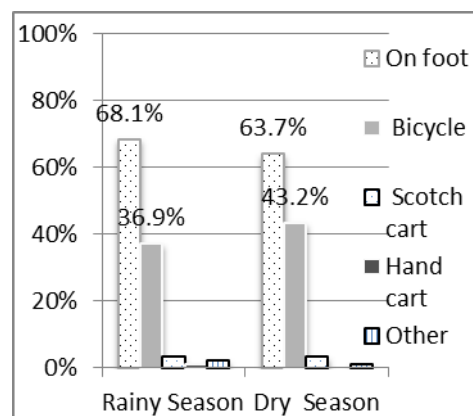

Figure 10.4.16   Responsibility of Fetching Water

Figure 10.4.17   Means of Transportation to Water Sources

(2)   Washing Premises

Washing of clothes during the rainy season is mostly done inside the house premises (85%), or secondarily in nearby water sources such as rivers or wells (15%).   However, during the dry season, the percentage of washing within the premises fell to 68.9% while washing at nearby water sources increased to 31.1% (Figure 10.4.18). After the construction of the water facility, washing nearby water sources will be prohibited.   Education of the community, especially women, who are those largely responsible for water use, is necessary to improve understanding of safe water.
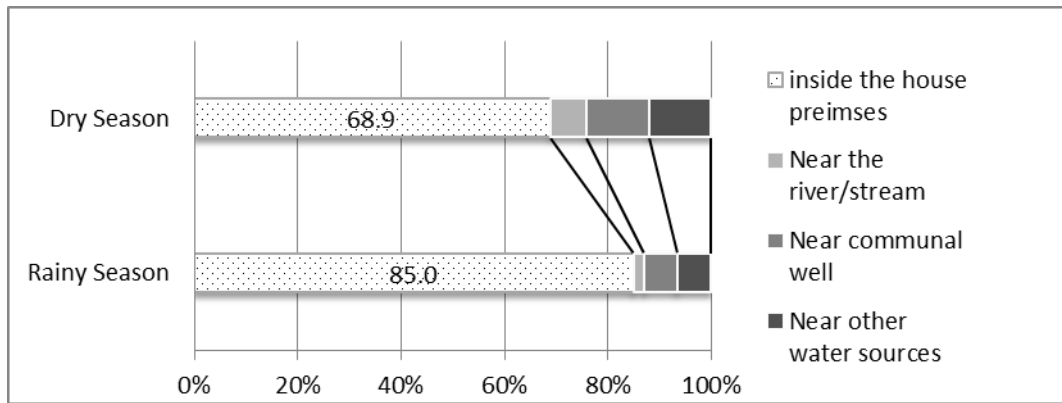
Figure 10.4.18   Washing Premises

(3) Decision Maker in a Household

Figure 10.4.19 below shows that 49.5% of households answered that the final decision is made by a male.   It emerged that 42.8% of households discuss and then make decisions.   7.7% of households answered that even women can make decisions on their own.   This result means that traditions of rural areas are still disadvantageous for women as a whole.   It is noted that decisions are made not only within households but outside them.   For example, in the Sukuma tradition, women are neither allowed to sit in front of men in public, nor speak before they are directed to do so by men.   Men also control household budgets, women's behaviour, and other activities.   It was also found that women are busy as they are responsible for cooking, cleaning, taking care of children, collecting firewood and water fetching.   Therefore, to encourage women's participation in any training, meetings or workshops for awareness raising of public health and hygiene or other meetings for a water user's group, involvement of the men is critical.
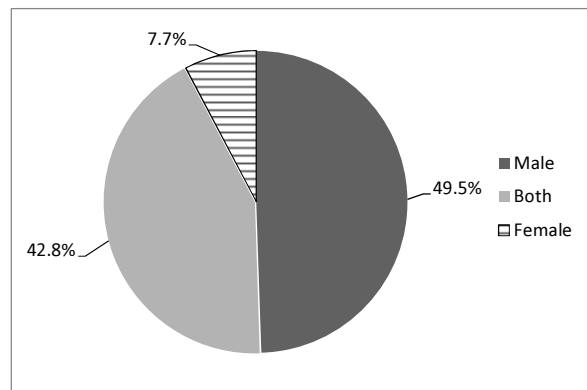

Figure 10.4.19   Decision Makers within Households

10.4.4 EXISTING WATER USE AND WATER NEEDS

(1) Current Water Use

According to the interview, the commonly used water source for priority villages was unprotected shallow wells (rainy season 49.5%, dry season 52.7%), followed by dam/Charco dam/ponds (rainy season 26.3%, dry season 23.3%), meaning more than half of households are dependent on unprotected water sources (Figure 10.4.20).   During the rainy season, rain water was also utilised in 21.5% of households, meaning an increased concentration on protected water sources capable of providing water throughout the year.

Protected shallow wells with hand pumps (rainy season 11.9%, dry season 12.0%), and protected deep wells (rainy season 7.2%, dry season 9.9%) tended to be utilised more during the dry season. The total percentage of households using protected water sources was 28.0% during the rainy season and 29.8% during the dry season.   Unfortunately, this figure for households using

protected water sources was almost equal to the data shown in the Household Budget Survey in 2002 (28.0%), meaning that improvement of rural water supply schemes in the rural area of the Tabora Region has stagnated since 2002.
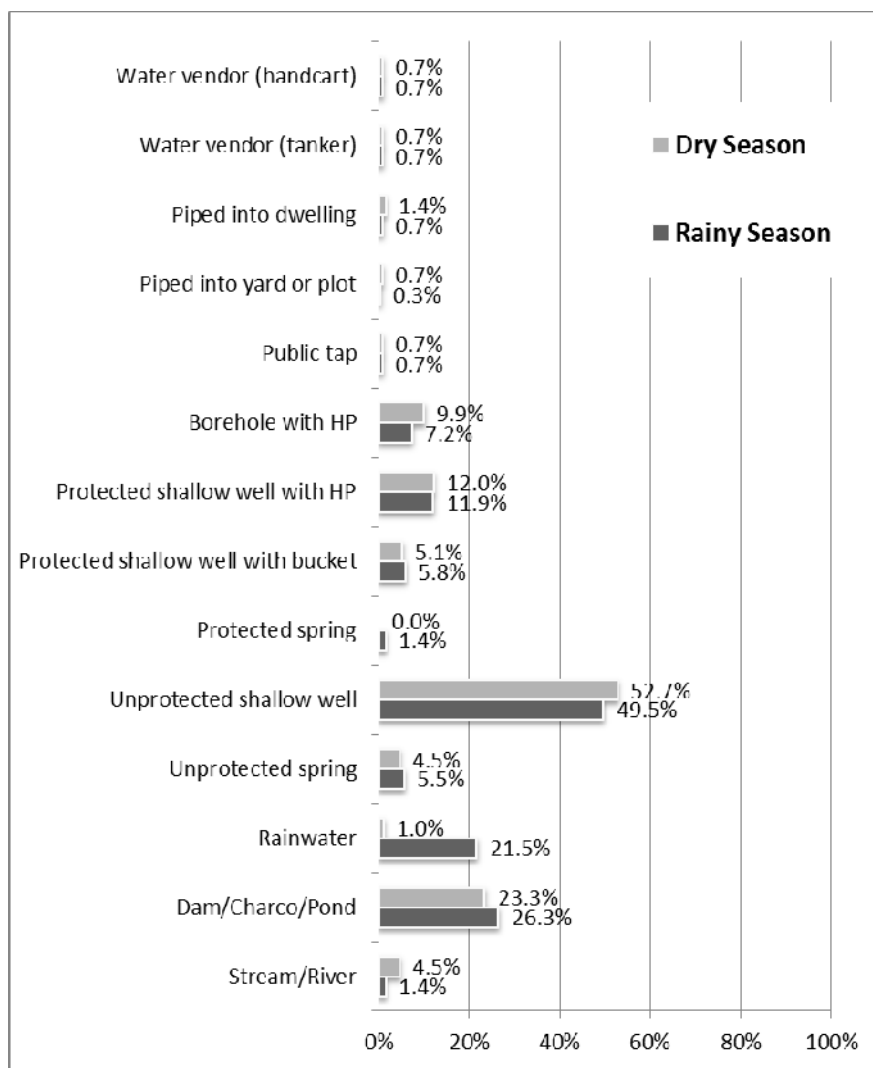

Figure 10.4.20   Existing Water Sources for Drinking

(2) Satisfaction with Water Service

Figures 10.4.21 and 10.4.22 indicate satisfaction over the current water quantity and quality. Satisfaction levels were selected from five categories, namely "very good", "good", "fair", "bad" and "very bad".   Most households were satisfied with the water quantity in the rainy season (79%: very good, good, fair), but less so in the dry season (47%: very good, good, fair).   The average water consumption per household (seven (7) people/household) was nine (9) buckets (20 liters) in the rainy season, and seven (7) buckets in the dry season.   Individual consumption was 25.7 litres per day during the rainy season and 20.0 liters per day in the dry season, which is roughly consistent with the average water consumption volume recommended as the Tanzanian standard.

Perceptions of water quality indicate unique results.   The majority are satisfied with the current water quality in both the dry season (69.7%: very good, good, fair) and the rainy season (66.0%: very good, good, fair).   During the rainy season, mud, grass or cattle dung with rain water poured into unprotected water sources, on which the majority depends, and more people perceived the water quality as lower, meaning the satisfaction level decreases slightly during the rainy season. This tendency is considered attributable to a lack of knowledge about safe water, hygiene and

sanitation, and an inability to compare safe and clean water as they have no alternatives. However, at the same time, one-third of the people are dissatisfied with the water quality ("bad" and "very bad" rainy season: 34.0%, dry season: 30.3%). Most complaints concern the water quality where livestock and human beings share the same sources.
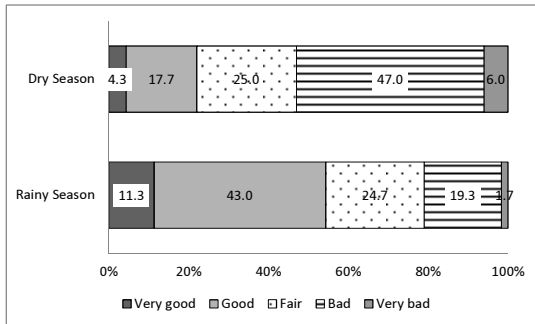

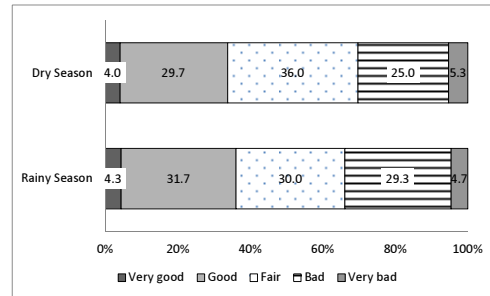**Figure 10.4.21 Satisfaction with Water Quantity**

Figure 10.4.22 Satisfaction with Water Quality

(3) Time Taken to Fetch Water

To understand the time taken to fetch water, the time required to reach water sources and the queuing time at the water point were surveyed. As shown in Figure 10.4.23 below, 82.3% of households took less than 30 minutes in the rainy season, but the number of households taking longer than 91 minutes increased from 3.0 to 22.7% in the dry season. With regards to queuing time at water points, as shown in Figure 10.4.24, waiting time in the rainy season was less than 10 minutes (79.7%), while the proportion decreased to 29.4% in the dry season. The increased waiting time was due to the greater concentration of people at limited water points with water available year-round, and even at such water points, the water yield was lower than the rainy season, meaning it took longer for the community people to fetch water.

The mean time required for fetching the water, including time for travelling and queuing, was 20 minutes during the rainy season and 63 minutes during the dry season respectively.

The Tanzanian government issued the National Strategy for Growth and Reduction of Poverty (NSGRP) and set the target of increasing the proportion of the rural population with access to clean and safe water from 53% in 2003 to 65% in 2009/10 within 30 minutes of time spent on water collection. The survey results showed that 56.7% of households had access to water sources of some kind in the rainy season, and 25.3% in the dry season. The results also indicate that existing level of water service is much lower than average of Tanzania.
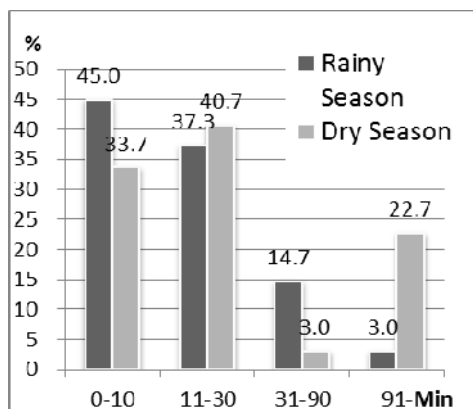
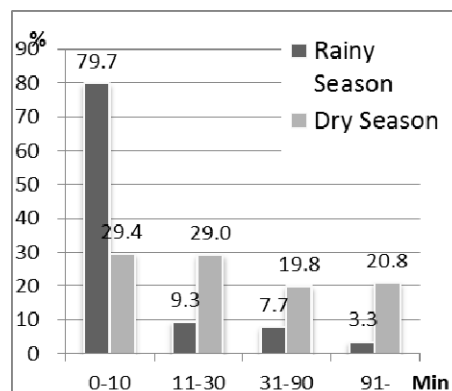

Figure 10.4.23 Time Taken to Fetch Water

Figure 10.4.24 Queuing Time at Water Points

(4) Priorities for Community Development

Priorities for community development provide information concerning issues that are most urgent or of highest interest to the communities.   Households were given seven options among electricity, health clinics and services, schools and education, water facility and services, sanitation and sewerage systems, disposal of garbage (solid waste), and access roads and roads within neighborhoods.

67.7% of households cited water as their key concern, and 15.0% as their second priority (Figure 10.4.25).   In total, 82.7% of households recognised it as a priority development area.   The second most required service was health facilities (66.3% both primary and secondary).
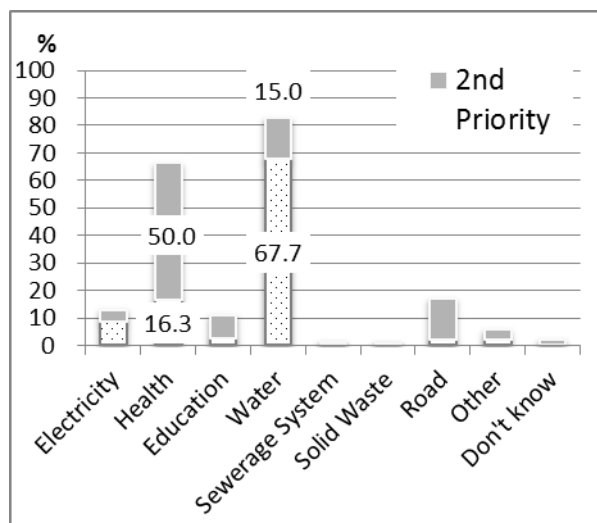
Figure 10.4.25   Priorities of Village Development

Furthermore, 85.0% of the community members expressed needs for new water facilities, even if they meant additional charges (Figure 10.4.26).   This also reflects the high demand for new water facilities in priority villages.   Through the interviews, male as well as female respondents also reported on the current difficult situation of fetching water.
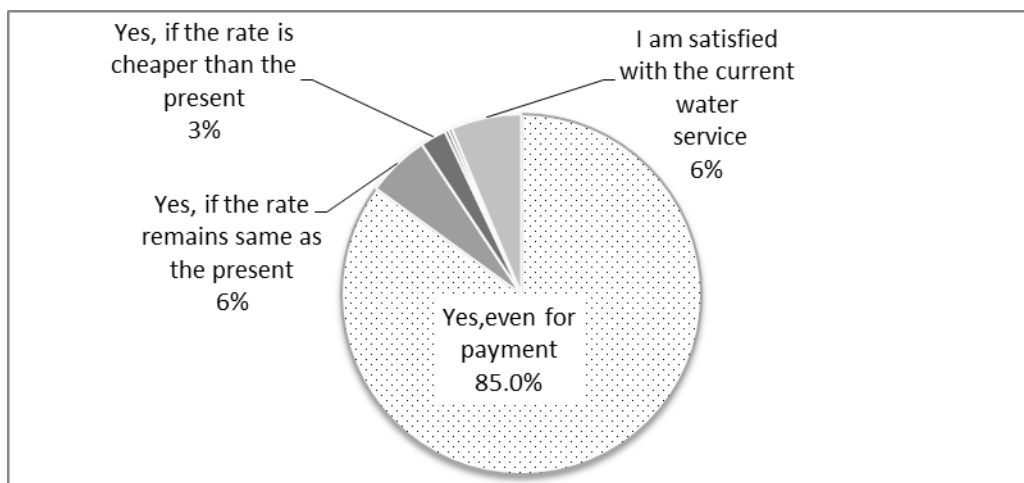
Figure 10.4.26   Needs for Water Facilities Even if Payment Required

10.4.5 ABILITY AND PERCEPTION ON OPERATION AND MAINTENANCE

(1) Responsibility of Operation and Maintenance in Villages

The government of Tanzania issued the NAWAPO 2002 and instructed to institutionalise a WUG or WUA in the community.   These organizations are entitled to ownership of water facilities with

legal registration and full cost-recovery of operation and maintenance.

According to the survey, the primary responsibility for daily operation and maintenance was recognised as that of "Users of the facility" (78.7%), followed by "Village Government" (11.1%), and "Village Water Committee" (5.7%). The primary payer for operation and maintenance was also recognised as "Users of the facility" (84.4%) and "Village Council" (7.8%). Based on these results, the majority of communities seemed to understand current trends on community responsibilities for operation and maintenance. However, when the village representatives were asked about water management organisation, as shown in Figure 10.4.27, WUG was formulated in one village (Isanga village in Nzega District), and WUA in two (2) villages (Kasandalala and Mabama villages in Sikonge and Tabora Rural Districts). Thus even these villages did not fulfil the required function such as legal registration of the facility and formulation of regulations, or collection of user fees, to be kept in the bank account.

In another 12 villages, although conventional VWC, which were established under the village council, were operated, most were non-functional as they lacked any particular responsibility for the role. Through the interview, the vulnerable management of VWC was exposed through statements of village representatives, e.g. "not knowing the manufacturer of the pump", "not knowing where to ask for assistance when the pump breaks down" or "not knowing the remaining water funds in their bank account".

The remaining five (5) villages did not form a water management committee of any kind.
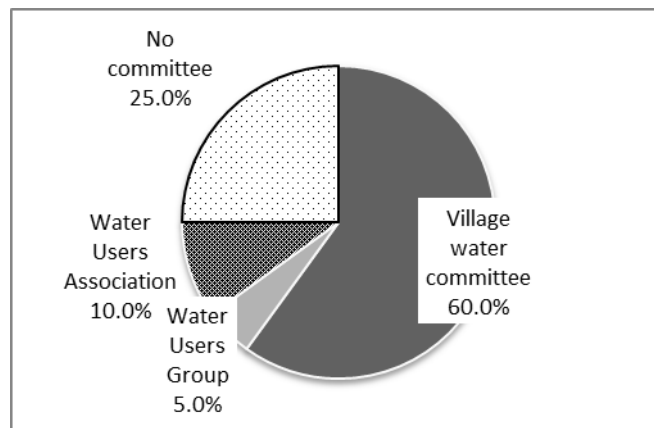
Figure 10.4.27 Existing Water Management Organisation in Target Villages

(2) Current Practice of Water Users Fee

As Table 10.4.2 shows, among the surveyed households, 12 households of two districts replied that there was a practice of paying for water (10 households of Isanga village in Nzega and two households of Imaramakoye village in Urambo). In Misha village in the Tabora Rural District, a water pipe was installed by the Tabora Urban Water and Sewerage Authority (TUWASA) and some households pay according to individual water bills based on their consumption. The other households have no custom to pay water user fees.

Table 10.4.2 Current Payment of Water User Fees

District	Village Name	No. of Households	Daily Payment amount per Household (Tsh)	
			Rainy Season	Dry Season
Nzega District	Isanga	1	160	160
		8	35 (1,000/month)	35 (1,000/month)
		1	10	10
	Imaramakoye	2	500 (25/ bucket)	500 (25/ bucket)
Total		12		

(3) Funding Account for Water Facilities

According to village representatives, the following five (5) villages opened bank accounts for water facilities: Busomeke village in Igunga; Mpombwe village in Sikonge; Ufuluma village in Tabora Rural; Uyui village in Tabora Municipality; and Kiloleni village in Urambo. In Isanga village (Nzega), although a caretaker is attached to the domestic point, no water user fee is set aside in a bank account. In other cases, the remaining balance was not recognised by the village representatives, or the balance was not used for operation and maintenance but only for new water facilities. Training in accounting, bookkeeping and fund management is necessary to improve the current situation.

(4) Current Working Conditions of Water Facilities with Hand Pump

As shown in Table 10.4.3 below, of the 20 priority villages, two (2) have no hand pump, 13 have operational water facilities, while the remaining five (5) lack functional facilities.

Table 10.4.3 Operational Water Facility with Hand Pump in Target Village

Yes, operational	13
Not operational	5
No wells with hand pump	2
Total	20

(village)

Seven (7) villages experienced recent breakdowns of the water facility with the hand pump, with only one village having repaired this by themselves (Table 10.4.4). The other villages did not succeed in repairing the breakdown. Two (2) villages requested assistance from the district council, but none was given. One (1) village took no action since its breakdown.

Table 10.4.4   Recent Breakdown History of the Water Facility with Hand Pump in Target Village

Recent breakdown history (village)		Action after finding breakdown of the water facility (village)	
No well with hand pump	2		
No breakdown	11		
Yes, breakdown occurred	7	Attempt made to repair by the community	1
		Asked district council, pending answer	2
		Asked district council, failed	1
		No action was made	1
		Other	2

Table 10.4.5 shows that, as regards financial resources for repair work, three villages paid using the village water fund, and the other three villages collected enough funds in each case.

Table 10.4.5   How the Cost of the Repair Works for the Water Facility Was Covered

From the Village Water Fund	3
Collecting Funds from each Household	3
Total	6

(village)

10.4.6   DESIRABLE WATER FACILITIES AND WILLINGNESS TO PAY

(1)   Desirable Type of Water Facilities

As shown in Figure 10.4.28, the most desirable water facility types are a borehole with hand pump (52.7%), a piped scheme from the borehole (22.7%) and a protected shallow well (18%).   Based on the interviews, what most concerned community members was whether reliable water sources were available near their household.   Thus the difference between hand pump and the piped scheme was relatively unimportant to them.
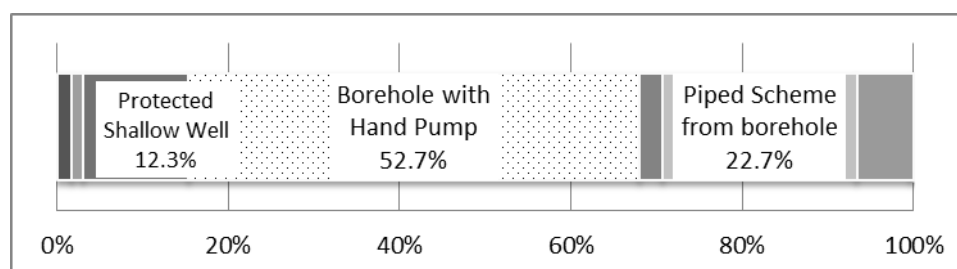
Figure 10.4.28   Most Desirable Water Facility Type

(2)   Willingness to Pay and Mode of Payment

In this study, the following three points are considered as determining Level-2 type of facilities to the community to secure sustainability:

i)   The cost to be borne by the user community shall not exceed 5% of household income.

ii)   The amount that the community is willing to pay shall exceed the amount that the community actually contributes.

iii) There are fewer traditional water sources available.

Based on the results of the drilling test and the water quality analysis of this study, four (4) villages that are particularly well-suited for the introduction of Level-2 water facilities were examined.

Table 10.4.6 shows a summary of the results.   First, the household income was within the range of

150,001 - 200,000 Tsh/month in four villages. Therefore, 5% of income is 7,500 Tsh/month.   A detailed calculation of the required cost has already discussed in Chapter 7.

Secondly, in terms of willingness to pay, Mabama was high with 0.84Tsh/L, followed by Kakola with 0.64 Tsh/L, Isanga with 0.36Tsh/L and Mpunbuli with 0.23 Tsh/L, respectively.

In the region of Dar es Salaam, Coast, Lindi, Mtwatra where grant aid water supply projects by the Government of Japan were implemented, it generally holds that 1 Tsh/L is set as the water user fee for the piped water supply scheme.   In addition, an estimate by the Project for Water Supply Development around the Metropolitan Area shows that the operation and maintenance cost, including the rehabilitation cost for a Level-2 water supply facility for a population of approximately 2,500, can be covered by this water user fee of 1 Tsh/L, with collection from 80% of the population.

Considering the above conditions, the willingness to pay of the target villages in the Tabora Region did not reach 1 Tsh/L.   However, the respondents were seen to hesitate in setting the user fee, because they had never paid before.   Community awareness and training for operation and maintenance might pave the way to increase the fee.

Thirdly, the only water sources on which the majority can currently depend are traditional ones. There seems to be an increased number of traditional water sources near their house, especially in the rainy season.

Table 10.4.6   Basic Data for Examining Level-2 Introduction

	Isanga	Mpumbuli	Mabama	Kakola
Level 2 willingness to pay	0.36 Tsh/L	0.23 Tsh/L	0.84 Tsh/L	0.64 Tsh/L
Monthly household income (Mean; Tsh/month)	150,001 - 200,000	150,001 - 200,000	150,001 - 200,000	150,001 - 200,000
Traditional water sources	Many	Many	Many	Many

The results of the priority village as a whole are as indicated in *Table 10.4.7* with willingness to pay for Level-2 of 0.66 Tsh/L and Level-1 of 0.41 Tsh/L.

Table 10.4.7   Amount That Villagers Are Willing to Pay for Water

Piped scheme water facility (Level-2)				
	Bucket (Tsh)	**Monthly (Tsh)**	**Total**	**Missing**
Sample No.	25	235	260	40
Median	50	2000	-	-
Tsh/L	2.5	0.47	0.66	-
Borehole with pump (Level-1)				
	Bucket (Tsh)	**Monthly (Tsh)**	**Total**	**Missing**
Sample No.	26	254	280	20
Median	20	1500	-	-
Tsh/L	1.0	0.36	0.41	-

(3)   Preferred Mode of Payment

Villagers were asked about the most convenient mode of payment (*Figure 10.4.29*).   60% preferred a flat rate per household in the form of a monthly payment, while 18% preferred a progressively increasing monthly tariff, and 17% preferred a flat rate per container.   Many respondents stated that it was convenient to prepare payment once a month rather than daily or weekly in order to continue payment.
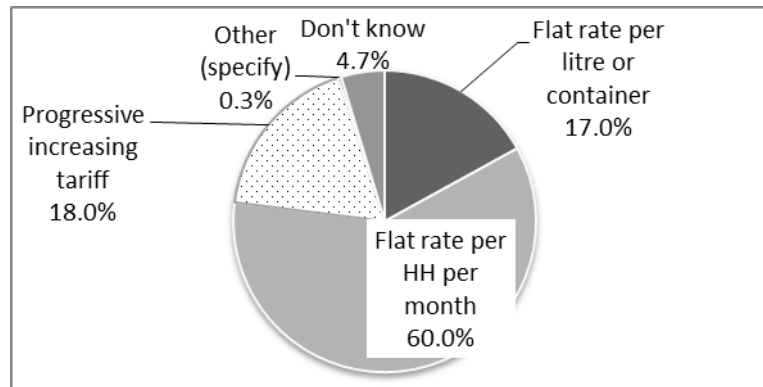
Figure 10.4.29   Preferred Mode of Payment for Water

10.5   OTHER OBSERVATIONS

Other than the analyses mentioned above, the following three (3) observations are made through the survey.

(1)   LACK OF ROAD INFRASTRUCTURE

In Tabora, road infrastructure is underdeveloped, and access among regions, districts, villages, and sub-villages is not easy.   During the rainy season, two thirds of roads are impassable and means of transportation are limited.   Thus the JICA study team shall carefully plan its activities such as field surveys, workshops and training.   Meanwhile, the community side has no network of public transportation to the district town.   The study team shall take this point into consideration when formulating a plan for establishment, operation and maintenance of a supply chain.   The most common means for transportation in the community is bicycle.   Arrangement of bicycle spare parts, technicians, and a repair office needs to be considered within a reasonable distance for the community people.

(2)   NEEDS FOR INCOME GENERATION DURING THE DRY SEASON

The field survey found that months of income last only three to four months.   For the rest of the year, the community has no alternative income source.   To secure positive outcomes, it is necessary for the community to continue to use safe and clean water that is obtained by paying water tariffs.   However, the existence of an improved water scheme itself does not necessarily generate income or employment opportunities.   To secure sustainable operation and maintenance, awareness raising on sanitation and hygiene together with income generation is necessary, especially in Tabora.   The long custom of accessing water without paying water tariffs might cause difficulties in changing behaviour of the community people.   In fact, some men stated that they do not want to pay for water if they can pay a higher price for the local beer.   Income generation activities such as small scale irrigation or basket making by existing community organizations will help the community members pay water tariffs.   In Tabora Municipality, a missionary NGO produces and sells water filters made of a clay pot that filtrate bacteria without boiling water.   This might be a good example in improving both income generation and public health.

(3)   CAPACITY DEVELOPMENT OF EXPECTATIONS FROM THE COMMUNITIES

Inadequate administrative support, such as provision of technical assistance and monitoring for the community has been attributed low operation rate of water facilities in Tanzania.   In Tabora Region, formulation of DWST was encouraged in all six (6) districts, in order to follow up monitoring of water facility by the community, and support establishing WUA and WUG, preparing regulation and conducting training for operation and maintenance.   However, the team is not actively functional, nor having clear responsibility as the local government. In the course of

formulating WUA and WUG, capacity development of DWST is also necessary enable close relationship between the communities and provides technical assistance and information to them.

10.6 CONCLUSION

- Various indicators related social development such as education and living environment show steady improvement in villages in Tabora Region. Economic situations vary depending on each village. Some priority villages are wealthy in terms of cash income, but the others are lower than the average.

- The intervention of the water sector lags behind, with most households still dependent on unprotected traditional water sources. That increases the burden for women and girls, especially during the dry season. There is an urgent need for assistance to improve the current situation. The community members also recognise that water is the most prioritised issue to improve their lives.

- The dwelling type of the village is mostly "scattered type", which is less suitable for Level-2 type water facility. Furthermore, road conditions deteriorate during the rainy seasons, which makes difficult to access some villages.

- Most of the communities have experience of several forms of communal work and have the basics in place to provide funds, material and labour for community development.

- Most target villages are based on agriculture. Thus it is recommended to hold meetings or conduct training during the dry season when more people can participate. It should be noted that half of households are livestock keepers, and water sources are often shared by livestock and people.

- The current community water management system is vulnerable. Thus it is necessary to undertake holistic capacity development on establishment of a committee/group, collection of the water user fee, financial management, and technical training on operation and maintenance. Not only capacity development for the community but also capacity development for DWST is required to backstop monitoring and evaluation in the community.

- Villages which collect water user fees are limited, and the willingness to pay for water is insufficient to cover the operational cost for level 2. In the implementation, however, it is important to ensure sufficient awareness creation and village mobilisation that is also sustainable in terms of water facilities. In addition, mid-term monitoring and follow-up will be required to secure sustainable operation.

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CHAPTER 11   ENVIRONMENTAL AND SOCIAL CONSIDERATION

11.1 SOCIAL AND ENVIRONMENTAL CONSIDERATIONS OF JICA

11.1.1   PURPOSE

The overall objectives of environmental/social consideration are to evaluate potential adverse environmental and social impacts derived from the implementation of the water supply plan which will be established by the JICA study team, propose feasible mitigation measures and provide alternatives for decision makers by Tanzanian C/P with support of a JICA Study Team member.

This study will be conducted in line with Japan International Cooperation Agency Environmental and Social Consideration Guidelines (hereinafter referred to as JICA Guidelines) and Tanzania Environmental Impact Assessment Procedure and Guidelines (hereinafter referred as Tanzania Guidelines).

11.1.2   PROCEDURE

This project is categorized as "B" by the preparatory study team.   According to the JICA guidelines, the procedure of environmental and social consideration would be as following extract from the JICA guidelines.   The procedure is shown in Figure 11.1.1.

---

1. JICA involves a member(s) for environmental and social considerations in study teams;

2. JICA collects relevant information and conducts field surveys in a wider area than that of preparatory studies, conducts scoping together with the recipient governments, and prepares TOR of environmental and social considerations studies;

3. The TOR includes understanding of development needs, impacts to be assessed, study methods, analysis of alternatives, a schedule, etc.;

4. In accordance with the ToR, JICA conducts IEE-level environmental and social considerations studies in which are analyzed alternatives including a "without project" situation. The results are incorporated into various reports prepared in the study process, accordingly;

5. JICA reviews screening based on the results of IEE-level studies. For studies newly categorized into Category A, JICA takes procedures as noted in those of the feasibility study of Category A, mentioned in 3.3.3.1.   For studies again classified into Category B, the results of environmental and social considerations studies are incorporated into drafts of the final reports. For studies newly categorized into Category C, the process of environmental and social considerations is finished;

6. JICA prepares drafts of the final reports, into which are incorporated the results of environmental and social considerations studies, and explains them to the recipient governments to obtain comments.   The comments are incorporated into final reports;

7. JICA prepares final reports, and submits them to the recipient governments after confirming that they meet the requirements of the guidelines;

8. JICA holds consultations with local stakeholders after information disclosure, in collaboration with the recipient governments, if necessary; and

9. JICA discloses final reports promptly after their completion, on its website and at the JICA library and a concerned overseas office.
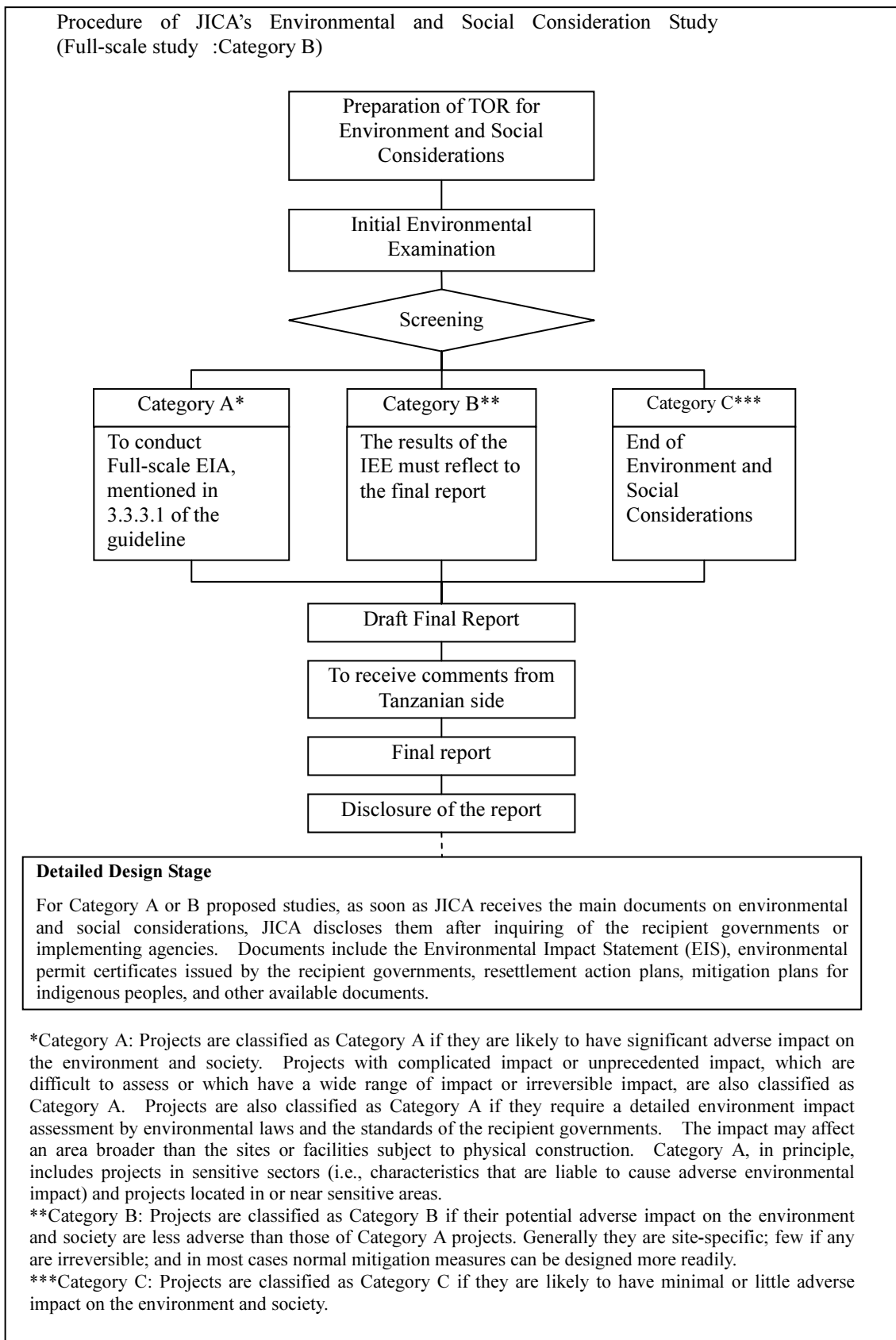

Procedure of JICA's Environmental and Social Consideration Study
(Full-scale study :Category B)

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              ┌─────────────────────────┐
              │  Preparation of TOR for │
              │  Environment and Social │
              │      Considerations     │
              └─────────────────────────┘
                          │
              ┌─────────────────────────┐
              │  Initial Environmental  │
              │       Examination       │
              └─────────────────────────┘
                          │
                 ◇ Screening ◇
        ┌─────────────┼─────────────┐
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│ Category A*  │ │ Category B** │ │ Category C***│
├──────────────┤ ├──────────────┤ ├──────────────┤
│ To conduct   │ │ The results  │ │ End of       │
│ Full-scale   │ │ of the IEE   │ │ Environment  │
│ EIA,         │ │ must reflect │ │ and Social   │
│ mentioned in │ │ to the final │ │ Considerations│
│ 3.3.3.1 of   │ │ report       │ │              │
│ the guideline│ │              │ │              │
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              │      Tanzanian side     │
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              │  Disclosure of the report│
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Detailed Design Stage

For Category A or B proposed studies, as soon as JICA receives the main documents on environmental and social considerations, JICA discloses them after inquiring of the recipient governments or implementing agencies.   Documents include the Environmental Impact Statement (EIS), environmental permit certificates issued by the recipient governments, resettlement action plans, mitigation plans for indigenous peoples, and other available documents.

*Category A: Projects are classified as Category A if they are likely to have significant adverse impact on the environment and society.   Projects with complicated impact or unprecedented impact, which are difficult to assess or which have a wide range of impact or irreversible impact, are also classified as Category A.   Projects are also classified as Category A if they require a detailed environment impact assessment by environmental laws and the standards of the recipient governments.   The impact may affect an area broader than the sites or facilities subject to physical construction.   Category A, in principle, includes projects in sensitive sectors (i.e., characteristics that are liable to cause adverse environmental impact) and projects located in or near sensitive areas.
**Category B: Projects are classified as Category B if their potential adverse impact on the environment and society are less adverse than those of Category A projects. Generally they are site-specific; few if any are irreversible; and in most cases normal mitigation measures can be designed more readily.
***Category C: Projects are classified as Category C if they are likely to have minimal or little adverse impact on the environment and society.

Figure 11.1.1   Flowchart of JICA Environmental and Social Consideration Procedure

11.2 EIA FRAMEWORK OF TANZANIA

11.2.1   NATIONAL POLICIES

There are mainly two (2) national policies on environmental issues. They are described below.

- **National Environmental Policy (1997)**

National Environmental Policy (NEP) has formulated by compiling the National Environmental Action Plan (1994) and National Conservation Strategy for Proposal Sustainable Development (1995) considering the following points.

1. to ensure sustainability, security and equitable use of resources for meeting the basic needs of present and future generations without degrading the environment or risking health or safety

2. to prevent and control degradation of land, water, vegetation, and air which constitute our life support systems

3. to conserve and enhance our natural and man made heritage, including the biological diversity of the unique ecosystems of Tanzania

4. to improve the condition and productivity of degraded areas including rural and urban settlements in order that all Tanzanians may live in safe, healthful, productive and aesthetically pleasing surroundings

5. to raise public awareness and understanding of the essential linkages between environment and development, and to promote individual and community participation in environmental actions

6. to promote international co-operation on the environment agenda, and expand our participation and contribution to relevant bilateral, sub-regional regional or global organizations and programs, including implementation of treaties

- **National Water Policy (2002)**

This policy was revised in 2002 in order to develop a comprehensive framework for sustainable development and management of the Nation's water.   The major change after revision shows that roles of Government as a service provider shift to those of coordination, policy and guideline formulation and regulation.

- **National Strategy for Growth and Reduction of Poverty (2005)**

The National Strategy for Growth and Reduction of Poverty (NSGRP) is a second national organizing framework focusing on poverty reduction.   One of the five (5) goals is that increased access to clean, affordable and safe water, sanitation, decent shelter and a safe and sustainable environment and thereby, reduced vulnerability from environmental risk.   The practical goal is: Increased proportion of rural population with access to clean and safe water from 53 in 2003 to 65% 2009/10 within 30 minutes of time spent on collection of water, through Implementation of programs for increasing access in rural and urban areas through rehabilitating, expanding, protected water supply systems and construction of new water sources.

- **Water Sector Development Programme (2006-2025): WSDP**

The purpose of the WSDP is to support the National Water Sector Development Strategy (NWSDS), which outlines ways of implementing the National Water Policy 2002 (NAWAPO).   The immediate aim is to increase access to clean and safe drinking water to at least 90% of urban residents and 65% of rural residents.   The Water Sector Development Programme is comprised of four (4) components namely;

     i.   Water Resources Management

    ii.   Rural Water Supply and Sanitation Services

   iii.   Urban Water Supply and Sewerage Services

   iv.   Sector Institutional Strengthening and Capacity Building

11.2.2   ENVIRONMENTAL LAWS AND RELATED REGULATIONS

- **National Environmental Management Council Act (1983)**

Among various environmental laws and regulations, the National Environmental Management Council Act is to be referred to in Environmental Impact Assessment (EIA).

This environmental law enacts the National Environmental Management Council (NEMC), which is a statutory body in its advisory role to the Ministry of Natural Resource and Tourism (MoNRT). As a practical advisory body, NEMC developed and published Tanzania Guidelines and approves EIA processes.

11.2.3   OTHER RELATED LAWS AND REGULATIONS

Other related laws and regulations are summarized in Table 11.2.1.

Table 11.2.1   Related Laws and Regulations

	Laws and Regulations	Establishment Year
1.	Wildlife Conservation Act	Enacted in 1974, amended in 1978
2.	The Forest Act	Enacted in 2002
3.	Protected Places and Areas Act	Enacted in 1969
4.	Water Utilization (Control and Regulation) Act	Enacted in 1974, amended in 1981
5.	Local Government Act	Enacted in 1982
6.	Land Use Planning Commission Act	Enacted in 1984
7.	Land Acquisitions Act	Enacted in 1967
8.	Graves (Removal) Act	Enacted in 1969
9.	Land Act, Village Land Act	Enacted in 1999
10.	Fisheries Act	Enacted in 1970
11.	Fisheries Act and Regulation	Enacted in 1973

11.3 PROCEDURES OF ENVIRONMENTAL IMPACT ASSESSMENT IN TANZANIA

11.3.1   GUIDELINES OF NATIONAL ENVIRONMENTAL MANAGEMENT COUNCIL

According to Tanzania Guidelines in 2002, projects identified to give potentially adverse impacts on surrounding environments or vicinities must be evaluated and assessed under NEMC supervision.   However, in 2008, a water sector guideline is promulgated for projects under WSDP.

This guideline will be explained later.

Tanzania Guidelines which consists of five volumes.   The first volume describes general EIA procedures while other volumes define details of EIA procedures.   The titles of each volume are shown below.

> Volume 1:   General EIA Guideline and Procedure
> Volume 2:   Screening and Scoping Guideline
> Volume 3:   Report Writing Guideline and Requirements
> Volume 4:   Review and Monitoring Guideline
> Volume 5:   General Check List of Environmental Characteristics

According to General EIA Guidelines and Procedures (Volume 1), there are mainly 10 steps in the EIA procedures.   The linkage of each step is illustrated in Figure 11.3.1 and Figure 11.3.2; however, after 2008, projects under WSDP will have to file a check list of Environmental and Social Management Framework (ESMF) before registration.   If the project is evaluated as Category A or B, then the PP will register the project to NEMC.   For those projects which are categorized as "C", MoW will evaluate them and will proceed them to the approval process.

> Step 1:   Registration
> Step 2:   Screening
> Step 3:   Scoping
> Step 4:   Impact Assessment
> Step 5:   Preparation of Environmental Impact Statement (EIS)
> Step 6:   Submission of EIS
> Step 7:   Review of Environmental Impact Statement
> Step 8:   Permitting/ Decision
> Step 9:   Environmental Monitoring and Auditing
> Step 10:   Decommissioning

In Step 1, a project proponent (PP) is required to prepare registration documents describing the project outline and submitting it to NEMC.   The Registration fee is currently Tsh 20,000.

In Step 2, NEMC will conduct screening as to identify the type and area of potential adverse impact within 15 days after receipt of a registration document from PP and notify the result of the screening to PP.   The results of screening will be concluded with four (4) different requirements for EIA approval.   Those requirements are anticipated as the following four (4) cases.

> Case 1   To conduct full Environmental Impact Assessment（EIA）
>   (See EIA mandatory list and Project list may or may not require)   The box below shows water supply facilities which will require full EIA.

> *19 . Water Supply*
>   *- Canalisation of water courses*
>   *- Diversion of normal flow of water*
>   *- Water transfers scheme*
>   *- Abstraction or utilization of ground and surface water for bulk supply*
>   *- Water treatment plants*

> Case 2   To conduct Preliminary Environmental Assessment（PEA）
> Case 3   No EIA or PEA required
> Case 4   To alter the nature of the proposed project due to expected excessive adverse impact

In Step 3, the PP commissions an Environmental Expert/EIA Consultant will prepare a Scoping

Report and Terms of Reference (ToR) for conducting EIA.   The Scoping report and draft ToR is submitted to the National Environment Management Council for review and approval before the commencement of the EIA study.

In Step 4, an EIA study is conducted according to the approved ToR, the Environmental Management Act No 20, of 2004 and the Environmental Impact Assessment and Audit Regulations of 2005.   EIA experts or a firm of experts undertake a detailed survey of the existing social, economic, physical, social-cultural and institutional environment within the project boundary.

In Step 5, an environmental expert or firm of experts prepares an Environmental Impact Statement (EIS) observing the contents of the EIS as outlined in the EIA and Audit Regulations 2005.

In Step 6, the PP submits 15 copies of an EIS also called EIA Report to NEMC for review by the Cross-sectoral Technical Advisory Committee (TAC).   The PP facilitates the review process by paying the review costs to NEMC as required by the Environmental Management Act.

In Step 7, NEMC reviews the EIS adhering to review criteria and approved ToR developed during the scoping exercise.   The Council may call for a public review of the EIS in accordance with EIA and Audit Regulations.   The Council prepares a review report and recommendations on the EIS and the project.

In Step 8, NEMC submits the review report and all documents used in the review process to the Minister responsible for Environment with its recommendations for issuance of an EIA certificate or disapproval.

In Step 9, PP conducts internal monitoring on the implementation of mitigation measures.   The Council conducts control monitoring in order to evaluate the performance of the mitigation measures, adherence to approved plans, environmental standards and general compliance with terms and conditions set out in the EIA certificate.

When the project finishes operating, Step 10, a decommissioning report is prepared by the PP and submitted to NEMC.
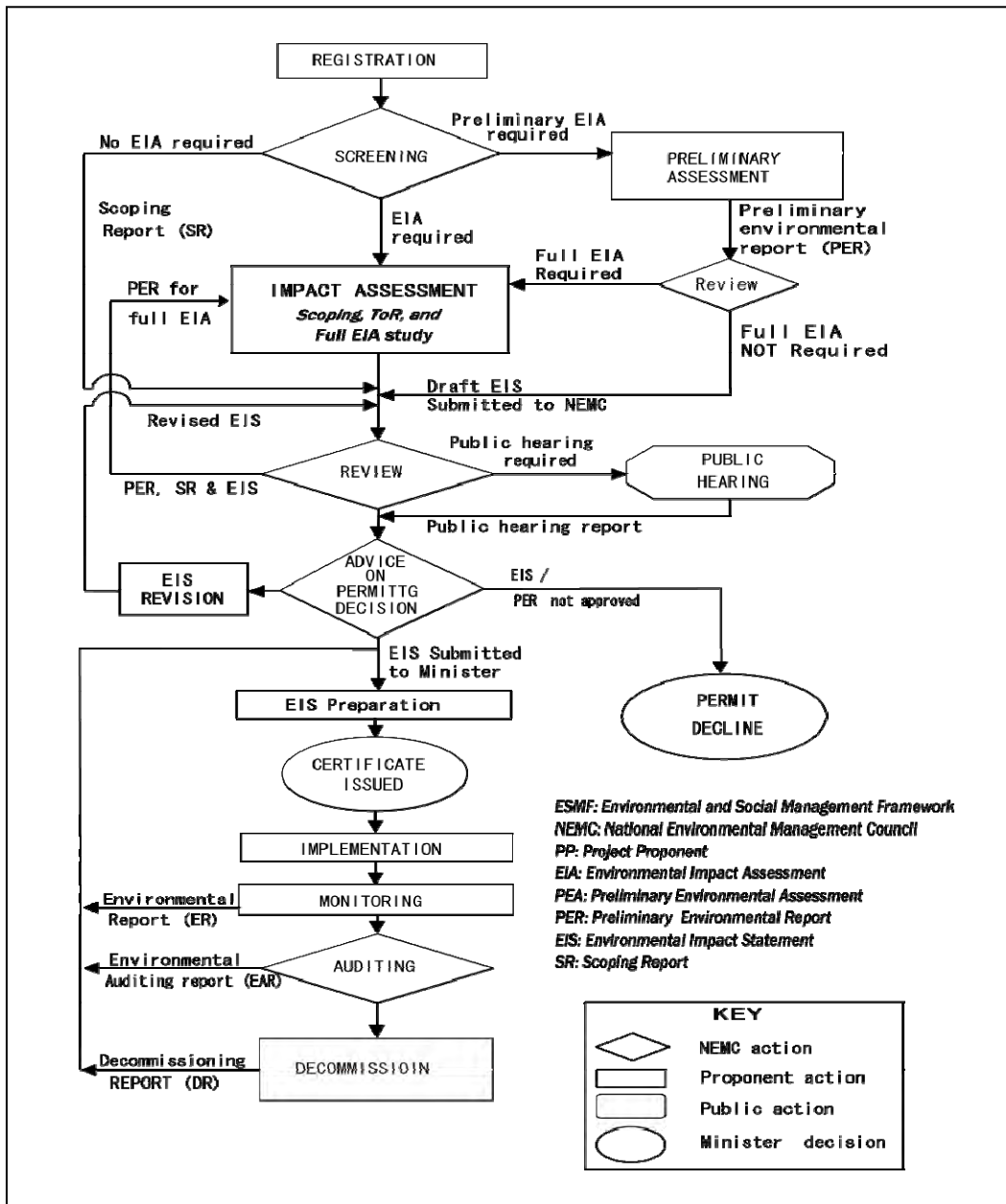
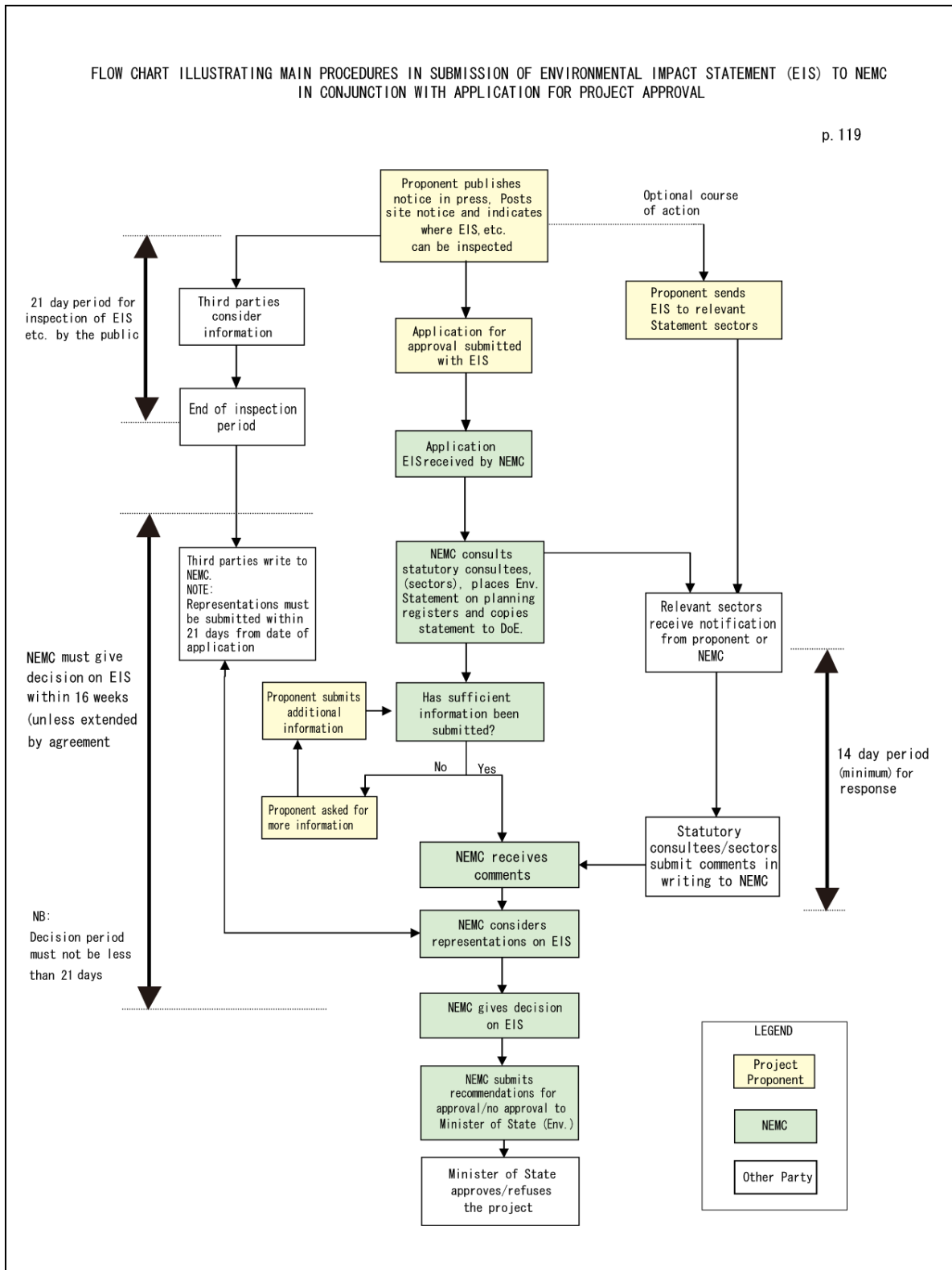**Figure 11.3.1   Flowchart of Tanzania EIA Procedure**

FLOW CHART ILLUSTRATING MAIN PROCEDURES IN SUBMISSION OF ENVIRONMENTAL IMPACT STATEMENT (EIS) TO NEMC
IN CONJUNCTION WITH APPLICATION FOR PROJECT APPROVAL

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Proponent publishes notice in press, Posts site notice and indicates where EIS, etc. can be inspected

Optional course of action

Proponent sends EIS to relevant Statement sectors

21 day period for inspection of EIS etc. by the public

Third parties consider information

Application for approval submitted with EIS

End of inspection period

Application EIS received by NEMC

Third parties write to NEMC. NOTE: Representations must be submitted within 21 days from date of application

NEMC consults statutory consultees, (sectors), places Env. Statement on planning registers and copies statement to DoE.

Relevant sectors receive notification from proponent or NEMC

NEMC must give decision on EIS within 16 weeks (unless extended by agreement

Proponent submits additional information

Has sufficient information been submitted?

14 day period (minimum) for response

No   Yes

Proponent asked for more information

NEMC receives comments

Statutory consultees/sectors submit comments in writing to NEMC

NB: Decision period must not be less than 21 days

NEMC considers representations on EIS

NEMC gives decision on EIS

NEMC submits recommendations for approval/no approval to Minister of State (Env.)

Minister of State approves/refuses the project

LEGEND

Project Proponent

NEMC

Other Party

Figure 11.3.2   Submission Procedure of EIS

11.3.2   GUIDELINES OF MOW

The ESMF 2008, an EIA guideline for WSDP, was proclaimed by MoW (then MoWI) in May 2008, in order to complement NEMC's EIA guidelines (Figure 11.3.3).   In ESMF, PP should mention the specific location and the facility, where as traditional EIA guidelines didn't specifically require. It guides PP to analyze all possible impact and environmental and social issues in relation with proposed specific developments.   ESMF provides PP the mechanisms for ensuring wholesome planning by identifying the potential environmental and social impact of the specific WSDP facilities and selecting mitigation measures through an environmental and social screening process. Since each identified facility in this project is required to file an environmental assessment in accordance with the checklist, timing of conducting the environmental impact assessment should be in Phase-2 of the Study.   If facilities are identified as "Category B" or "Category A" by ESMF, the PP would be required to file full EIA under MEMC in accordance with procedures noted in 11.2.3.   If a facility is identified as "Category C", the environmental and social consideration study will be ended within the mandates of MoW.   Another characteristics of ESMF is that its thorough checklist given to the construction firm for preventing adverse impact during the construction phase; and monitoring the plan during its operational phase.

11.3.3   INVOLUNTARY RESETTLEMENT GUIDELINE

Resettlement Policy Framework (RPF) will be a guideline for resettlement related support in a course of implementation of the water supply project in Tanzania.   RPF provides appropriate support for project affected persons (PAPs) for their land acquisition, resettlement, and compensation.   The responsible agency for implementing RPF is District Council/Authorities, and MoW, Ministry of Local Government, Ministry of Health, and other related organizations.   The main objectives of RPF are as follows.

- A Full Understanding of the Project components, particularly those requiring land acquisition
- Determination of land ownership
- Screening of the project sites and activities
- Property and asset valuation
- Preparation and approval of resettlement action plans (RAP)
- Implementation and monitoring of the RAP
- Effective redress of complaints and grievances
- Public consultation and participation

The following are major contents of RAP, according to RPF.

1) Description of the Project
2) Potential impact
3) Objectives
4) Socio-economic studies
5) Legal framework
6) Institutional framework
7) Eligibility
8) Valuation and compensation for losses
9) Resettlement measures
10) Site selection, site preparation and relocation
11) Housing infrastructure and social services
12) Environmental protection and management
13) Community participation
14) Integration with host population
15) Grievance procedures

　　　16) Organizational responsibilities
　　　17) Implementation schedule
　　　18) Cost and budget
　　　19) Monitoring and evaluation

The project sites with the operation, and the land owners were surveyed by the Study; and, it was confirmed that all project sites are "public land".　Therefore compensation and relocation of the residents would not be necessary in this project, and further steps in RPF.　Although there are sites which require conversion of agriculture field to access road to the facility, all respective village executives are agreed with the change of land use.

11.3.4　INTEGRATION OF THE TWO PROCEDURES

There are two (2) procedures applicable to the Study.　One is JICA's Environmental and Social Consideration Guideline; the other is a combination of ESMF of MoW (2008) and EIA guidelines of NEMC.　Both of the guidelines are similar; however, there are some technical differences. One of the big differences is that the JICA guideline is designed to be conducted in Phase 1 of the Study, in order to find the best possible strategic planning in the early stages of the Study; on the other hand, ESMF is designed to find potential serious adverse impact of the actually planned facility.　The similarity of the two is that they require full environmental impact assessment if preliminary assessment finds the undertakings as Category A or Category B.　Their relationship is shown in Figure 11.3.4.
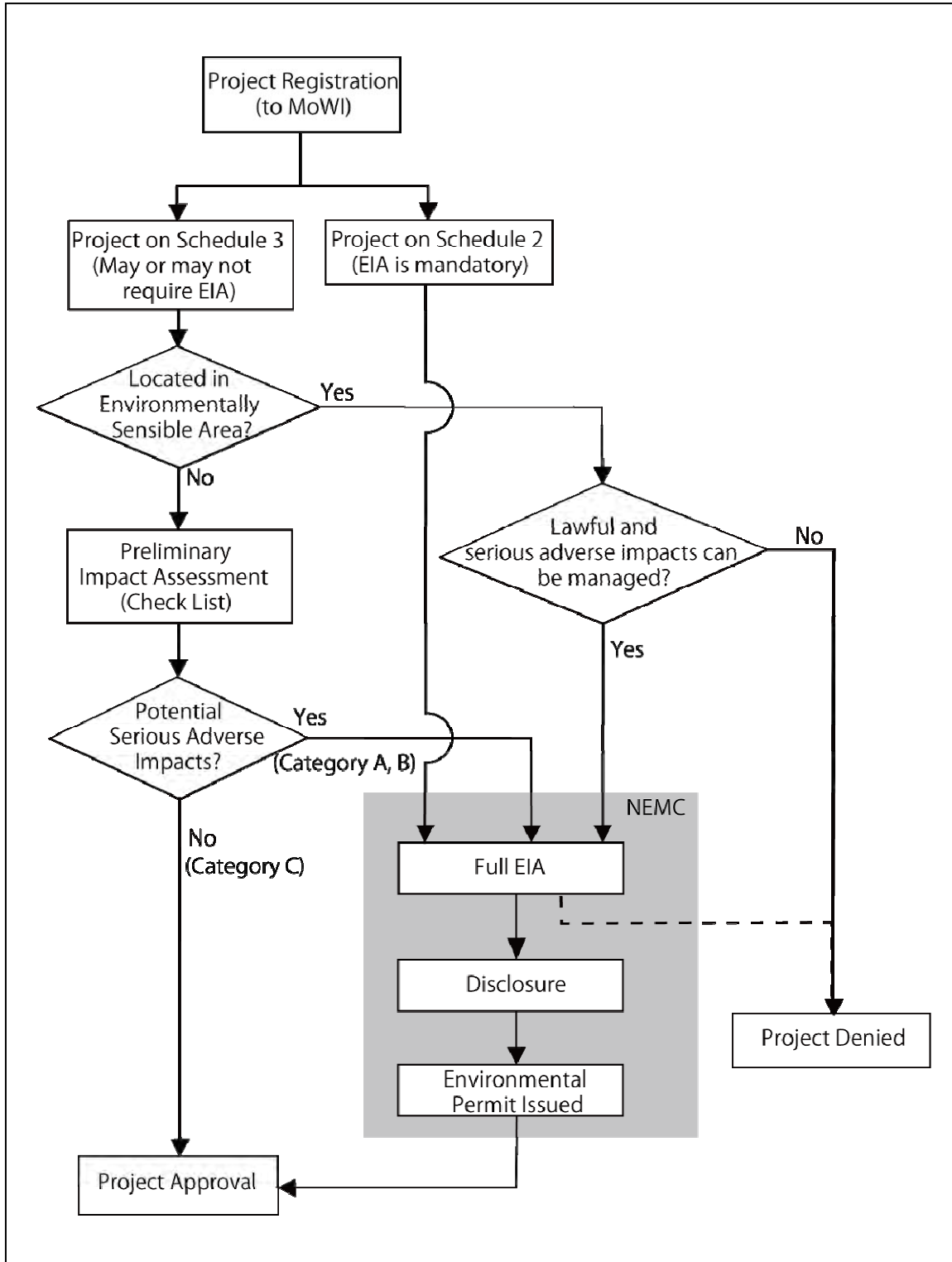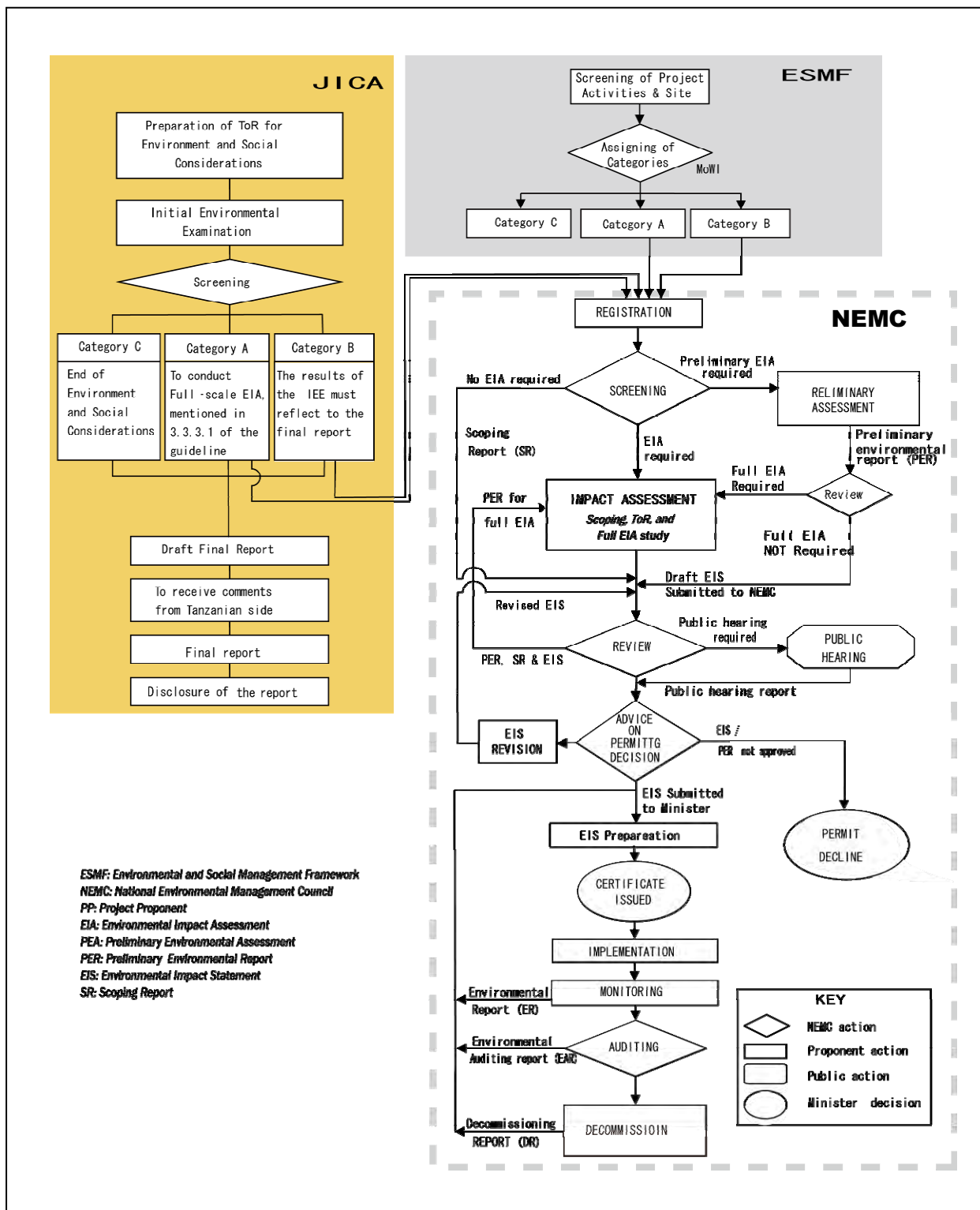
Figure 11.3.3 MoW's ESMF Procedure

Figure 11.3.4 Relationship of Procedures Applicable to the Study