4.4.8 Water and Sanitation

1. Benefits of the Development of Water and Sanitation

- Provide adequate water supplies to be consumed;
- Improve public health;
- Cut the distance and time to obtain water;
- Create new jobs;
- Create easier maintenance environmental sustainability of water resources
- Through a management system of clean water, will evenly spread the limited resource.

2. Overview

The total population of Timor-Leste in 2008 (*Timor-Leste Dalam Angka*) is 1.078.942 persons, with a total land area of 14.915 Km^2 (Table 1. Population per District). A graphic population distribution can be seen on Figure 1: Population Distribution and Figure 2: Land Area Distribution. The growth of the population is projected by the National Statistic Directory so the need for water and sanitation can be forecasted, especially for those living in urban areas. Table 2: Basic Needs Sufficiency in the year 2001 and 2007 can be seen below. In the year 2007, the sufficiency of basic need is relatively better than 2001.

The clean water program can generally be divided in to two groups, which are the urban area and the rural area. The DNSAS (National Directorate of Water Supply and Sanitation) is responsible for the distribution of clean water in urban and rural areas. The DNSAS has 270 permanent employees and 1142 non-permanent employees, while the total land area is approximately 17,000 km2 with a total population of 1,047,632 (Table 3: DNSAS Employees). In Dili and Baucau, the development of water and sanitation infrastructure is managed by the Utility Boards or Management Concession contractors.

Table 4.50 - Population Distribution by District

Distrik	Total Population	Total Area (Km²)	Population per (Km²)
Aileu	62,407	738	84.562
Ainaro	45,724	810	56.449
Baucau	113,748	1,504	75.630
Bobonaro	93,787	1,378	68.060
Covalima	62,764	1,197	52.434
Dili	212,469	365	582.107
Ermera	116,871	768	152.176
Lautem	65,349	1,812	36.065
Liquica	69,925	549	127.368
Manatuto	41,217	1,782	23.130
Manufahi	53,995	1,323	40.813
Oecusse	67,736	813	83.316
Viqueque	72,950	1,876	38.886
Total	1,078,942	14,915	72.339

Source: Timor Leste in Figures 2008

Figure 4.21 - Graph of Population Distribution by District

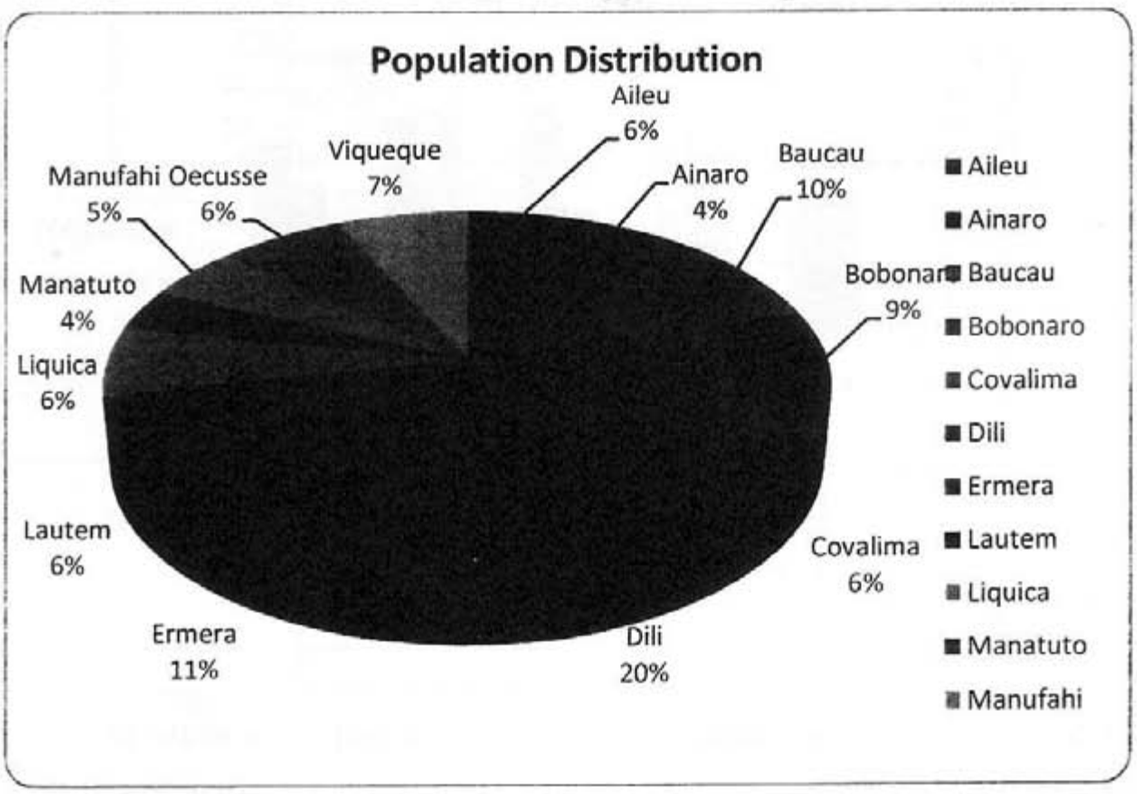


Figure 4.22 - Graph of Area Distribution

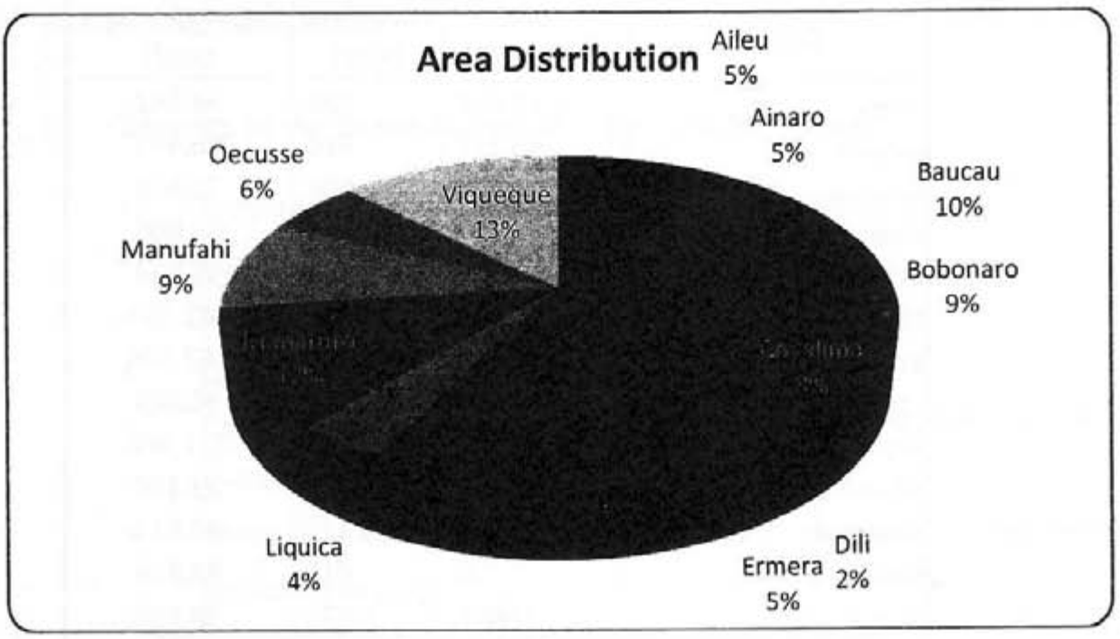


Figure 4.23 - Graph of Basic Needs Sufficiency (in percentage)

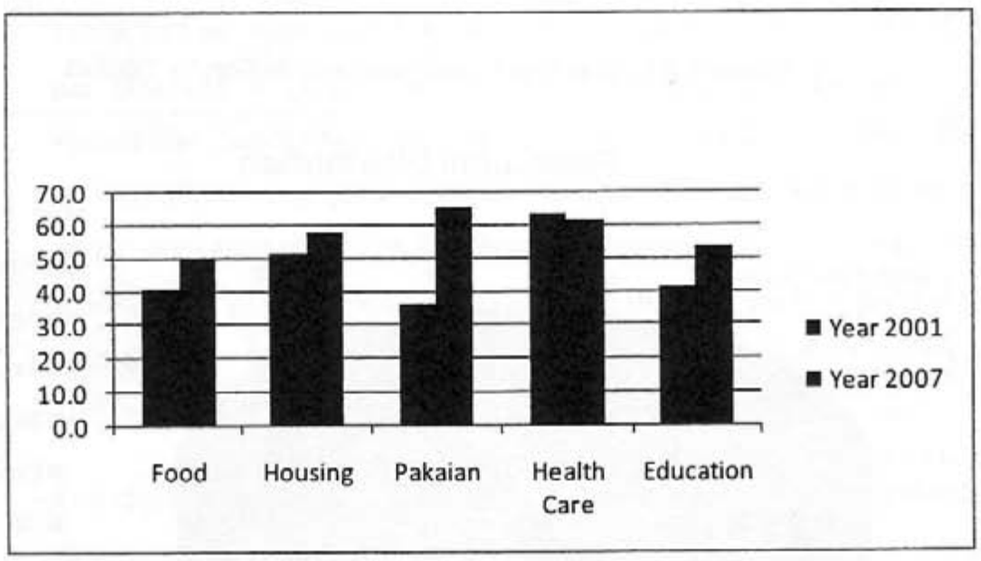


Table 4.51 - Basic Needs Sufficiency

Basic Needs	Preception	2001	2007	2007	
		National		Rural	Urban
		% of Population			
Food					
	Insufficient	59.2	50.0	56.6	31.4
	Enough	40.5	49.2	42.6	67.8
	Abundance	0.3	0.8	0.8	0.8
Housing					
	Insufficient	48.9	41.6	46.9	26.7
	Enough	50.8	57.4	52.1	72.3
	Abundance	0.3	1.0	1.0	0.9
Clothing					
	Insufficient	64.0	34.8	39.7	20.9
	Enough	35.9	64.7	59.8	78.4
	Abundance	0.1	0.5	0.5	0.6
Health Care					
	Insufficient	35.9	36.9	44.5	15.5
	Enough	62.8	61.3	53.5	83.2
	Abundance	1.3	1.8	2.0	1.3
Education					
	Insufficient	52.9	39.3	43.5	27.5
	Enough	41.1	52.7	47.1	68.4
	Abundance	0.6	1.5	1.6	1.2
	None	5.3	6.4	7.7	2.9

Source: 2001 TLSS dan 2007 TLSLS.

Table 4.52 - DNSAS Employees

Education	Persons
SD	30
SLP	60
SLA	144
D2	14
D3	10
S1	12
S2	
S3	
Total	270

In urban areas (Dili and other capital districts), some homes are connected with water and public taps, while the rest use wells and other water sources. Some rural areas are serviced through simple piping which is maintained in groups, but most use wells and other water resources. Clean water and sanitation services are assisted by various NGOs, while in urban areas, governments and foreign assistance is the norm. Sanitation is mostly still

considered as a household responsibility. In all of Timor-Leste, there are only three sewage settling ponds. Considering the importance of water and sanitation, more assistance is needed from the Ministry of Health.

According to a census completed in 2004, the level of clean water in urban areas is; 13% have home connections, 16% receive water from public taps (29% total service of total population). In rural areas, service coverage is less than 30%.

Meanwhile, according to an estimate from DNSAS in 2007, national clean water access is less than 43% in urban and sub-urban areas, while rural access is 41%. According to a survey report from UNDP in 2004, only 13% have home connections and 16% have public taps. The rest use wells, rivers, and other water sources.

In the year 2002, a basic urban water supply Infrastructure Asset Management System (IAMS) was established through WSSRP to create an urban clean water infrastructure for 2003 to 2022 with a service target of 250%.

In Dili, the raise in water connection services from the year 2002 to 2008 amounts to 20% (from 8,491 to 10,860 connections, 95% are home connections). More than $30 million have been invested through WSS since 2000. The capacity for water processing production is 11,200m^3/day (Bemos, Lahane, and Benemauk from JICA).

In 2006 WSS SIP reports an average water consumption of 208 litters per capita per day. The estimated total population of Dili is 175,730 persons in 2008, which means that the water demand in Dili is 12,433 m^3 per day. Service through 41 public taps is still free until this day.

3. Condition of Water Infrastructure

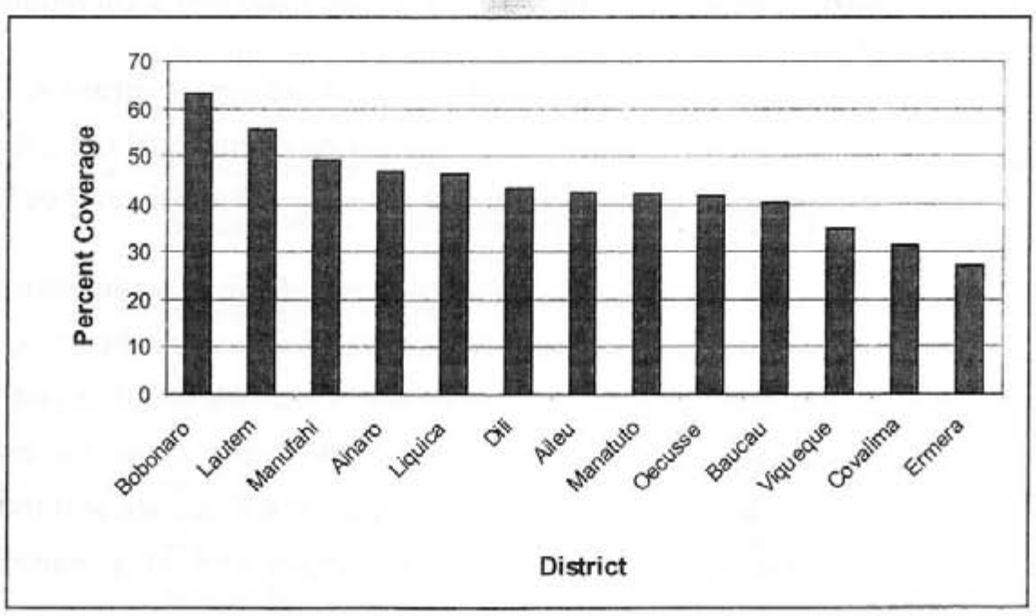
In general, infrastructures built in the time of an Indonesian controlled government have been damaged. In summary, the clean water infrastructure conditions are as follows; water sources are generally still in good condition but there is the possibility of damage when hit by floods; filtration equipment has been rehabilitated in 4 years and now in good condition; drilled wells in the city of Dili was rehabilitated and functional; many pipeline transmission

are damaged/old; reservoirs were rehabilitated; the condition of distribution pipes is not known because most are in the ground; many houses connections are not working/damaged; water loss rate is high

a) Service in Urban Areas

In the year 2006, according to the SIP WSS, there are 6.600 house connections and 235 public taps. The level of service still depends on the season. Produced water quality generally meet basic standards in the processing level but the quality will decrease at the distribution level due to lack of pressure and old piping and leakages. District level service levels can be seen in Figure 4.

Figure 4.24 - Water Supply Service Levels in 2007



b) Dili

The level of population density and growth in Dili is included the a level high category. On site sanitation infrastructure is not sufficient; ground water level are high, drainage systems are inadequate and not maintained, management of waste management exacerbate the lack of environmental health.

This condition gives negative impact on the water and beaches, even though many households use shallow wells. This causes the piping water conditions that cannot be relied upon. Based on the 2003 survey,

6% of households have toilets with septic tanks, 40% with have pit latrines, 24% do not have lavatories, and 30% use public lavatories.

In addition to reviewing the sanitation study, the TEFT WSSRP 2003 study by Portugal, also formulates the master plan for water and sanitation. Meanwhile, JICA conducted a study of urban drainage and wastewater management strategies in 15 cities for the next 5 years. The current conditions are:

- 45 percent of households have poor drainage conditions
- 49 percent of households do not have waste management
- 71 percent of households keep cattle near the house / yard
- 88 percent of toilets do not meet basic standards
- 96 percent of the population demand better conditions

Water tariffs are set by the Ministry of Infrastructure in 2004 was $ 0.1 to $ 0.6 / 1000L. This is imposed on commercial users only. The above rates are still below the cost of treatment which reaches $1.00/1000L.

Operating and maintenance costs of house connections are $97 per year, or $17.6/person. While the benchmark indicator is $40/house or $7.5/person for 24-hour services (WSS SIP 2006). Investment costs for pipe connections to houses in the rural areas are more expensive because of the land area, population distribution and transportation of materials from the city. The average cost of a house connection is $55.00 (WSS SIP 2006).

Water demand per capita average varies to approximately 140 litters/day. If 1 household contains 5 people, 700 litters/day is required to fulfil a household; with a monthly consumption of 30 X 700 litters = 21,000 litters or 21m ^{3}.

The house connection investment cost (cost of materials, processing, reservoirs, transmissions, and distribution) for urban areas with 63,905 house connections is $ 942 million. The average investment is $1.474/house. Meanwhile, house connections in rural areas amount to 149,112 with a total investment of $112 million. The average investment cost for rural areas is $751/house.

Regarding the labour needs for clean water services, with the assumption of 100 households can be served by 1 person, 2,157 people are needed. For sanitation services (sewerage, drainage and garbage), with the same assumption, 2157 people are also needed. With these assumptions, the water and sanitation sector will generate employment for 4,314 people. This does not include labour for community outreach, administration and management. At the time of the project, with the assumption that 30% of investment costs are labour costs, $99 million will flow to the community at the time of the project.

Solid waste generation of household waste can be calculated mathematically. Assuming that waste amounts are 2.5 litters/capita/day, then the amount of garbage in Dili is estimated to be 530 m^3 per day. The amount in urban areas is approximately 1000 m^3, while the rural areas are about 2300 m^3. This amount is not concentrated, except in the city of Dili. However, considering future implications and nature conservation, environmentally friendly waste management issues should be handled properly.

c) Service in Rural Areas

Rural Water Supply

The level of water and sanitation services outside Dili is in an even worse condition. Fortunately, this is alleviated by a development effort that involves the participation of non-governmental organizations and foreign donors (donor consisting of IOM as a community aid agency, funded by USAID, ICRC, World Vision, CARE, and GOAL are involved in community development programs/CEP, which also assists funding for the improvements of bathrooms). But there are still many villages that do not have a water delivery system. To obtain water, women and children must walk several hours to rivers or water sources. It is not possible that all area can receive water connections. Donors consisting of IOM have also funded improvements of bathrooms and toilets in three schools.

Rural Sanitation

A DNSAS rough estimate in 2007 states that the number of sanitation facility users is approximately 10% of the entire village population or amounts to about 57.782 people. To enhance public participation, sustainable community partnerships are planned.

4. Policy Framework

The policy framework is based on the ideals of the people as stipulated in the legislation and passed through a vision that became targets and development targets which are implemented through development strategies.

Legal framework for the water and sanitation sector is still in process (the Government in 2005 with the help of the Asian Development Bank (ADB) began to implement an Integrated Water Resource Management Technical Assistance Project). Through this project, the national water needs and availability can be calculated. Preparation of a water resources policy and legal framework draft and policy implementation strategies can be formulated.

The Ministry of Infrastructure is also preparing other infrastructures' master plan. Given that the infrastructure sector is a basic need, the priority of the first phase is the fulfilment of basic needs.

The second phase's goal is to increase service quality, introduce operation infrastructure costs, participation in funding the costs of maintenance and operations, and sustainable development considerations for the long term.

The third phase is a continuation of the second phase, when the community is able to pay for infrastructure services. Funding will be considering involving private participation (Public Private Partnership). Welfare in urban areas will be more advanced than in rural areas, the readiness and ability of the public to pay for the commercialization of this sector in urban areas will not be the same as in the rural areas.

5. Problems and Constraints

a) Lack of legal framework of water supply and sanitation sector

b) Lack of raw water in the dry season and contaminated river water in the rainy season

c) Difficult in reparation and installation of pipes in certain areas

d) Lack of human resources to meet the needs of clean water and sanitation infrastructure (planners, engineers, and technicians)

e) High investment cost for water infrastructure

f) Lack of society awareness in the importance of clean water and sanitation for health

g) Lack of awareness to conserve, preserve and maintain the continuity of water supply

h) Low income for most of the community

i) High material cost for water and sanitation infrastructure construction, especially in rural areas

j) Natural and individual growth of settlements, with unplanned drainage and waste water drainage systems

6. Development Stages

Create a healthier Timor-Leste through water and sanitation services.

a) Short Term

Achieve the coverage target of water supply and sanitation services, which is 80% in 2015. (Considering that clean water is a basic need for health, and governments are aware of the funding and personnel management limitations of this sector, the strategy of this achievement must involve the community, government organizations and foreign aid, especially for rural areas)

b) Medium Term

- Continue the short-term program target that have not been achieved
- Increase service coverage

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b) Medium Term

- Continue the short-term program target that have not been achieved
- Increase service coverage

- Improve the quality of service
- Integrate inter-infrastructure programs (such as clean water with irrigation, health, and education)
- Conservation of resources

c) Long Term

- Clean water and sanitation infrastructure management innovation
- Increase welfare and community health
- Conservation of resources and the natural environment

7. Program

Programs are sustainably executed; goals that are targeted in the first year or short-term are continued to the next term. Priorities and staging is based on the readiness on implementation, and sector determinants such as roads and bridges, reservoir, irrigations, and power lines.

a) Short Term

- Establish a legal framework
- Establish service standards
- Complete a master plan
- Organize and strengthen the management institution of clean water and sanitation to the rural level
- Rehabilitation and construction of water and sanitation infrastructure
- Increase service coverage
- Train and educate prospective water and sanitation managers (waste water, housing waste and drainage)
- Education, counselling, health guidance and conservation awareness to the general public, increase for infrastructure costs awareness
- Introduce better waste management (e.g.: organic waste sorted for fertilizers while non-organic waste is recycled)
- Inventory and conservation management of water resources

b) Medium Term

- Maintain and continue the achievement of the short-term program targets
- Train and educate prospective water and sanitation managers(waste water, housing waste and drainage)
- Education, counselling, health guidance and conservation awareness to the general public
- Increase service quality and coverage
- Construction and maintenance of water and sanitation infrastructure
- Conservation of natural resources

c) Long Term

- Maintain and continue the medium-term program goals
- Increase service quality and coverage
- Conservation of natural resources

8. Ongoing Projects (2010 to 2020)

The development of water and sanitation service coverage target in 2009 is 1,114,500 persons (20% or 223.000 persons for the urban population, 80% or 891.500 inhabitants for rural residents). The service coverage target in 2015 is 80% or 1,065,084 people, equivalent to 213,016 families (30% or 319.526 inhabitants which is equivalent to 63,905 families in urban and 70% or 745.558 inhabitants which is equivalent to 149.111 families from rural areas). Donor assistance from the ADB, DWASH, USAID and AusAID is in need of a follow up for Rural Water SWSSP.

Until the year 2007, nearly $ 79.1 million has been spent on the water and sanitation sectors starting from 1999, including $30 million for the WSS sector projects in Dili. The estimated funding from donors is $ 81.9 million. It remains to be discussed again. Indications of projects in 2011 until 2015 can be seen in Table 4.53. It can be seen graphically in Figure 5.

Table 4.53 - Water Supply Investment Forecast 2011-2015

Item	Million $
Urban Water Supply	94.2
Rural Water Supply	112
Urban Sanitation	77
Rural Sanitation	46
Training and Education	3.3
Consultation	3.3
Conservation	3.3
Total	339.1

Figure 4.25 - Investment by Sector ($ Million)