REPUBLIC OF GHANA

COMMUNITY WATER AND SANITATION AGENCY
CENTRAL REGION

District Based Water and Sanitation Component (DBWSC)

ENVIRONMENTAL SANITATION ASSESSMENT AND AUDIT FOR SMALL TOWNS

- MANKESSIM, KISSI AND TWIFO MAMPONG -

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1 INTRODUCTION

This assignment forms part of the phase two of the Danida-supported Water and Sanitation Sector Support Programme (WSSPSII) – District Based Water and Sanitation (DBWS) Component. The DBWS component is expected, among other outputs, to carry out small scale sustainable environmental sanitation projects in 20 selected small towns under outputs related to improving environmental sanitation.

The proposed strategy includes, among others, supporting small towns to undertake environmental sanitation assessments and audits to aid the development of plans for incremental improvement in excreta management and disposal/treatment, refuse collection and disposal/treatment, as well as infrastructure for sullage and storm-water conveyance.

1.1 BACKGROUND

In fulfillment of the above programme, the Regional Coordinating Council (RCC), Central Region acting through the Community Water and Sanitation Agency in Central Region (CWSA)-CR has engaged WasteCare Associates to provide:

'CONSULTANCY SERVICES FOR SMALL TOWNS ENVIRONMENTAL SANITATION ASSESSMENT AND AUDIT IN CENTRAL REGION'

These initial environmental sanitation assessment and audits were carried out in three selected small towns in three districts of central region - ***Twifo Mampong in Twifo-Heman-Lower Dekyira District, Kissi in Komenda-Edina-Eguafo Abrim District and Mankesim in Mfantseman District***.

1.2 OBJECTIVES

The immediate objective of the assignment is *to carry out an assessment and audit of environmental sanitation to determine the existing situation of environmental sanitation in the three small towns*. This will lead to the development of Town Environmental Sanitation and Development Plans (TESDP) for each town that can be incorporated in DWSPs for particular districts, and prepare sub-projects to address prioritized interventions.

1.2.1 Expected Outputs

Immediate Output (Draft Report)

- Environmental Sanitation Assessment and Audit report for the three towns.

Final Outputs (Final Report)

- Town Environmental Sanitation Development Plan for each of the selected small towns with optimal solutions (sub-projects focusing on both social and infrastructural services), corresponding preliminary costs and proposed funding sources from (i) the DBWSC and (ii) other sources.

1.3 METHODOLOGY AND TOOLS

1.3.1 Literature Review

The following documents were assembled and reviewed in planning the assessment and audit protocols and procedures:

- Local Government Act, 1994 (Act 462)
- Environmental Sanitation Policy, 1999
- Environmental Protection Act, 1994 (Act 490)
- Environmental Assessment Regulations, 1999 (LI 1652)

- USID/EHP Guidelines for the Assessment of Sanitation Guidelines
- Strategic Planning for Municipal Sanitation
- SEA Practical Guide for Water and Environmental Sanitation
- Landfill Guidelines
- Health-care waste policy
- District Economic profiles
- Other relevant documents

Material gathered from the review was used to inform the development of the assessment and audit tools and related procedures.

1.3.2 Field Study

The environmental sanitation assessment and audit was carried out by segmenting each of the 3 towns into sampling areas:

- Mankessim was divided into 6 sampling areas based on housing segments and concentration of population. The sampling areas were as follows:
  - Sample Area 1 – Garage, New Nkusukum
  - Sample Area 2 – Edumadze, Dwenwoho, Esikafo Ambatem, Mantse Mankabe, Asomdwie, Zongo
  - Sample Area 3 – Twafo, Old Nkusukum, Ohwirefa, Obatanpa
  - Sample Area 4 – Anaafo, Obronwu, School Kessim, Gua Ekyir
  - Sample Area 5 – Estate
  - Sample Area 6 – Nananom, Official Town

- Kissi was divided into 4 sampling areas based on concentration of households. The sampling areas were as follows:
  - Sample Area 1 – Church Area
  - Sample Area 2 – Chief's Palace and Surroundings
  - Sample Area 3 – Old Market
  - Sample Area 4 – Lorry Park

- Twifo Mampong was divided into 4 sampling areas based on concentration of households. The sampling areas were as follows:
  - Sample Area 1 – Overhead Tank Area
  - Sample Area 2 – Apostolic Church
  - Sample Area 3 – Market
  - Sample Area 4 – Blacksmith shop

(Refer to Maps 1, 2 and 3 for enumeration areas).

1.3.3 Study Tools

Three instruments were applied:

- A structured household questionnaire for gathering data on environmental sanitation facilities and services
- Focus group discussions and key person interviews
- Environmental Profiling form

These participatory tools were derived from the Practical Guide on Strategic Environmental Assessment (SEA) of Water and Environmental Sanitation and supplemented with additional information from other sources.

1.3.4 Administering the Assessment and Audit Instruments

The processes adopted for the assessment and audit were highly participatory, in conformity with SEA principles.

District Administration officials, traditional authorities and opinion leaders were briefed on the whole process and their contributions taken into consideration prior to commencement. District Planning officers, District Water and Sanitation Teams (DWSTs), Regional and District Environmental Health officers were involved in the planning and identification of relevant issues in each town.

Household/Community Survey
In administering the questionnaire, the following parameters for each town were taken into consideration:

- Population – based on 2000 Population and Housing Census data and projected to 2007 using the generic formula:
  $P_{2007} = P_{2000} \times (1 + r)^n$, where r = district growth rate and n = number of intervening years (i.e. 7)
- Estimate of household size – based on 2000 Population and Housing Census and site visits
- Physical layout of survey areas – town maps, generated schematic layouts

The survey was designed for gathering information from households on:

a) Watershed management – including wetlands, surface water embankments etc
b) Water supply – types of systems, access, quality, quantity etc
c) Wastewater disposal – practices, effluents, ponding etc
d) Liquid (faecal) waste disposal – types of facilities, institutional facilities, location, access, management
e) Solid waste disposal – households, communal facilities, medical/health wastes, industrial wastes, sites, management etc.
f) Storm water drainage – types of drains, adequacy, capacity, flooding etc
g) Health and Hygiene practices – hand washing, cleanliness,
h) Bye Laws – availability, compliance, enforcement, etc.
i) Other significant features of interest – animal wastes, community mobilisation, public spaces, green areas, markets, lorry parks etc

Focus Group Discussions

Focus group discussions were conducted with men, women, elders and key local leaders in each of the towns. The list of persons met and consulted during FGDs and KPIs is attached as Annex 3.

Data Entry and Analysis

Household data gathered in the survey was entered and analysed using statistical analysis software – SPSS.

1.3.5 Mobilization of Personnel

In each of the towns survey assistants were identified and trained in administering the questionnaires. Each enumeration team were assisted by a survey assistant under the supervision of a senior member of the consultant's team.

Table 1.1: Survey Effort in Towns

Town	No. of Enumerators	No. of Days for Enumeration
Mankessim	6	6
Kissi	4	2
Twifo Mampong	4	2

The field studies comprising surveys and profiling were carried out from 8 – 24 February 2007.

2 PROFILE OF DISTRICTS AND STUDY TOWNS

This section covers findings from desk studies as well as field results from surveys, environmental sanitation profiling and consultations.

2.1 MFANTSEMAN DISTRICT

Geography

Location: The Central Region of Ghana

Coordinates: Latitude 5º07´ to 5º20´ North of the Equator and Longitude 0º44´ to 1º11´ West of the Greenwich Meridian

Area: 612km^2

Boundaries: The West and Northwest by Abura-Asebu-Kwamankese District, the North by Ajumako-Enyan-Essiam District and Assin South District, the East by Gomoa District and the South by the Atlantic Ocean.

Climate: Mild temperatures ranging from 24°C to 28°C
Relative humidity of 70%
Rainfall figures ranges between 900mm to 1100mm in the coastal savanna areas and 1100mm to 1600mm in the interior close to the margin of the forest.

Topography: Basically low-lying areas with an elevation lower than 60m above sea level. The area is drained by a number of rivers and streams, including the Nawkwa, Amisa (Ochi) and Bruka. The estuaries of these rivers are drowned by lagoons.

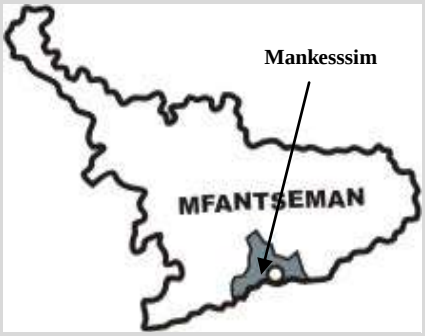
Natural Resources: *Forest* - Timber products, Fuel wood, Game resources
Minerals – Kaolin, Feldspar, Beryllium, Crude Oil, Diamond, Manganese, Salt.

Capital: Saltpond

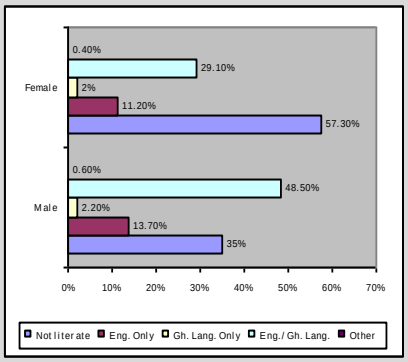
Demographic Characteristics

Based on the inter-censal period 1984-2000 the annual population growth rate is estimated as 2.8%. From the 2000 population and housing census, the district has an estimated population of 152,855 comprising 70,212 males and 82,643 females living in 168 settlements. The current estimated population is 185,452 comprising 85,185 males and 100,267 females. The district population constitutes almost 7% of the Central Region population.

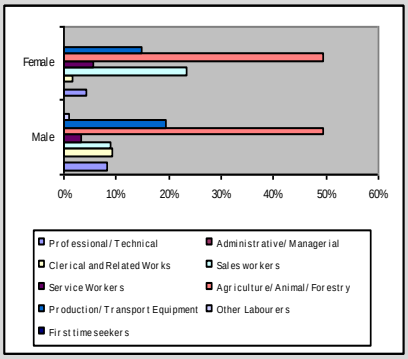
By current population estimates there are eight (8) settlements with population above 5000 which is the CWSA lower threshold for the definition of small towns. Mankessim is the largest of these towns.



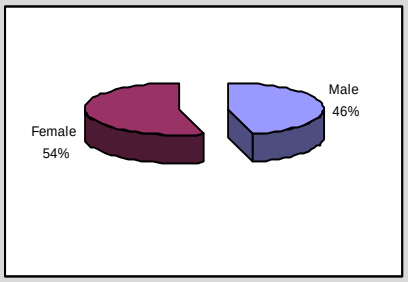
Percentage Distribution of Level of Literacy ***(Source 2000 Pop. Census)***



Categories of Occupations



Percentage Distribution of Population by Sex



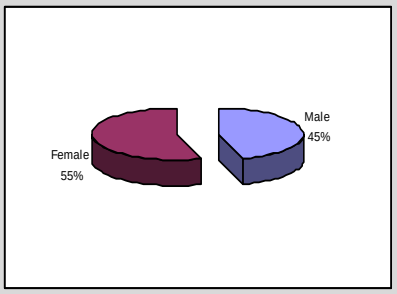
2.2 ENVIRONMENTAL SANITATION PROFILE OF MANKESSIM

2.2.1 (a) Population and Household Data

According to the 2000 population and housing census, Mankessim has a population of 25,481 (11,511 males and 13,970 females) with 2,419 houses. The number of households is 5,983 and the average household size is 4.3. Based on the 2000 population figure and the district growth rate of 2.8%, the current estimated population of Mankessim is 30,915 (13,966 males and 16,949 females).

The total number of households interviewed is 510.

Estimated Current Population Distribution by Sex



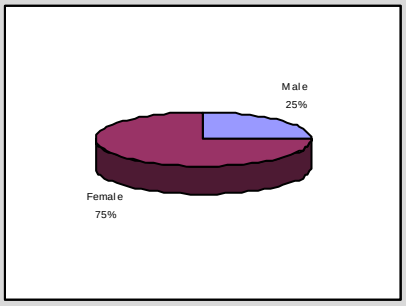
2.2.2 Characteristics of Respondents

On characteristics of respondents, the questionnaire addressed the following:

Sex of Respondents

24.9% of respondents were males and 75.1% females.

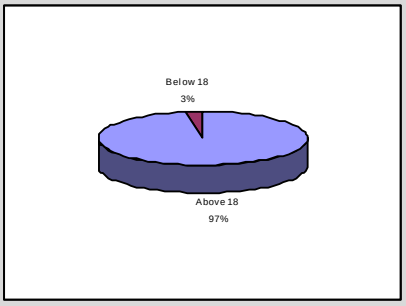
Sex of Respondent



Age of Respondents

97.2% of respondents are above 18 years of age and 2.8% below 18 years who interpreted for adult respondents.

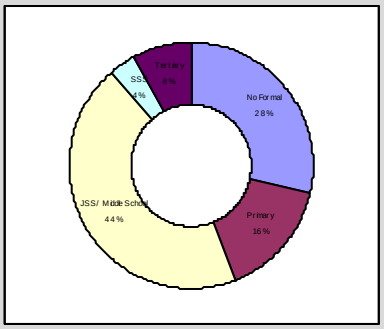
Age of Respondent



Level of Education of Respondents

7.9% have attained tertiary education level, 3.5% secondary education, 44.5% JSS/Middle school, 15.6% Primary education and 28.5% have no formal education.

Level of Education of Respondent

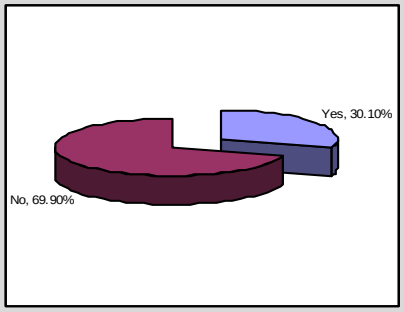


2.2.3 Potable Water Coverage

Water Connection

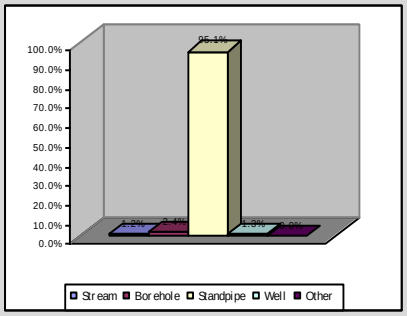
In Mankessim, 30.1% of respondents have water connection to their houses, of which only 12.4% are reliable. Hence only 4.72% of respondents in Mankessim have water connection with reliable flow. This value could be higher but at the time of the survey rehabilitation of the Baifikrom headworks and reconstruction of the Accra Cape Coast highway were on-going and have affected most of the main pipelines supplying water to the town.

Water Connection to Households



Sources of Water for Drinking

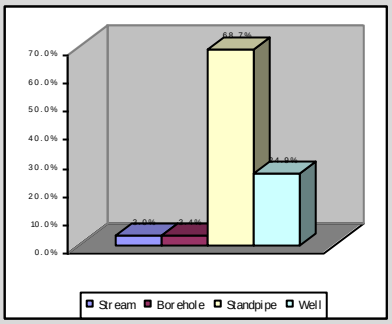
Data from the survey shows that sources of water for drinking purposes include stream (1.2 %), borehole (2.4%), standpipe (95.1%) and well (1.3%).



Sources of Water for Other Purposes

Responses from the survey shows that sources of water for other purposes aside drinking include stream (3%), Borehole (3.4%), standpipe (68.7%) and well (24.9%).

From above 28.3% of the respondents patronize either well or boreholes indicating the presence of groundwater in Mankessim. Further studies could be undertaken to investigate the viability of using mechanized boreholes if high yielding aquifer sources can be located.

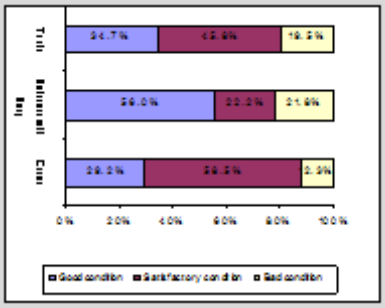


Quality of Water

For salinity, 34.7% of respondents indicated neutral taste of their water, 45.8% slightly salty and 19.5% salty.

With respect to hardness of water, 56% of respondents indicated good lathering, 22.2% said water lathers slightly well with soap and 21.8% said water does not lather with soap.

For appearance of water, 29.2% of respondents pointed out the fact that the water was generally clear, 58.5% slightly turbid (coloured) and 12.3% turbid.



2.2.4 Refuse Management

Based on Mankessim's population of 30,915 and applying a town-wide generation rate of 0.75 kg per capita per day, it is estimated that about 23 tonnes of solid waste is generated daily. Additional refuse is generated from commercial activities and the very large transient population that patronize the market and lorry station.

Household Solid Waste Storage

Data from the household survey shows that 39.8% have sanitary dustbins for primary storage of household waste. The receptacles used are not standard and varies from boxes, buckets, cartons etc. If primary collection service (House-to-House or Block) is to be introduced then education campaigns have to be embarked on to raise awareness on the advantages of using standard storage bins.

Availability/Access to Refuse Dump Sites

Data from the survey indicate that 74.1% of households have access to uncontrolled dump sites for disposing of their refuse.

Plate 2.1: Domestic and market refuse with high plastic content at an uncontrolled dump

Plate 2.2: Poor sanitation practices with waste discharged into wetland

Method of Refuse Disposal

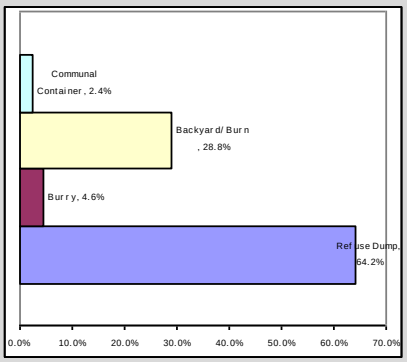
Responses from administering questionnaires show that 2.4% use communal containers, 28.8% throw at backyard and burn, 4.6% burn their refuse and 64.2% use refuse dump sites (uncontrolled dumping).

- Inability to pay tolls
- Inadequacy of communal containers
- Location of communal container too far from inhabitants.

Perception of Respondents

The residents of Mankessim view refuse management as very poor due to absence of formal refuse collection, indiscriminate dumping and long distances of dump sites to houses. This is supported by prevalence of indiscriminate littering and drains choked with refuse.

Methods of Refuse Disposal



Perception of Respondents on Solid Waste Management

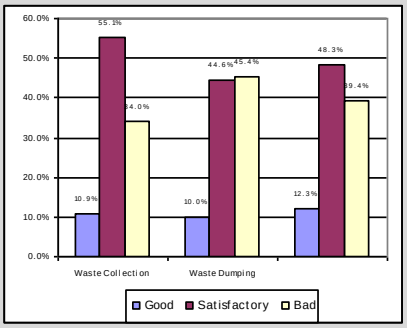


Plate 2.3: Storm drain heavily choked with plastics containing excreta

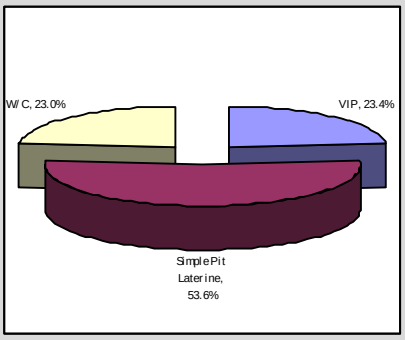
2.2.5 Excreta Management

In Mankessim 54.9% of all respondents have a household toilet facility.

Types of Household Toilet Facilities

Data from the household survey shows 53.6% use simple pit latrines, 23.4% use VIPs and 23.0% use W/C.

Type of Household Toilet Facilities

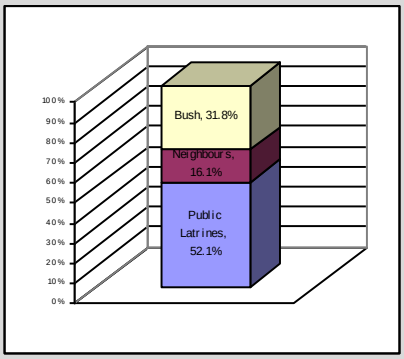


Methods of Excreta Disposal by Households Without Toilet Facilities

Human excreta disposal trends for households without toilets shows that 31.8% defecate in the bush, 16.1% use that of their neighbours and 52.1% use public toilets.

The communal and public toilets include KVIPs, Pan Latrines and Aqua privy. Most of these facilities are in a dilapidated state.

Methods of Excreta Handling by Households without Toilet Facilities



2.2.6 Storm Water and Sullage Conveyance

Storm Water Conveyance

On the issue of flooding 35.3% of respondents indicated occurrence of flooding whenever there is a heavy down pour. This is supported by the lack of storm drains in the town. The few existing drains in the town are heavily silted and choked with refuse.

Plate 2.4 Cross culvert heavily silted with solid waste, Mankessim

Disposal of Sullage from Kitchen and Bathroom

Disposal of sullage from kitchens and wastewater from bathrooms in Mankessim is poor. 8.6% use soakaway pits, 36.2% through shallow earth channels and 55.2% dispose in open spaces.

Disposal of Sullage from Kitchen and Bathrooms

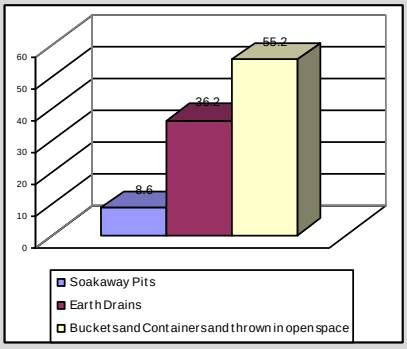


Plate 2.5 Shallow earth channel for sullage discharged from bathrooms

2.2.7 Health and Personal Hygiene

Handwashing Practices

The responses on handwashing practices in Mankessim are shown in the table below:

Hand washing with soap practices	Response	Proportions of Responses (%)
Before food preparation	Always	30
	Sometimes	34.6
	Never	35.4
Before meals (eating)	Always	53.6
	Sometimes	30.5
	Never	15.9
After using toilet	Always	67.2
	Sometimes	21.4
	Never	11.4
After attending to defaecation by children	Always	38.1
	Sometimes	41.3
	Never	20.6

General Hygiene Standards in Households and Community

Observations were made in the houses and community on the following:

- Use and keep latrine
- Remove animal or children's faeces from the home and safely dispose of them
- Manage and maintain safe, public sanitary solutions (for human and animal waste)
- Consume safe water
- Keep all water containers covered
- Obtain water for drinking/cooking from the least contaminated source available
- Manage and maintain safe, sanitary garbage disposal

The results have been summarised in Table 2.1 below.

Availability of Bye-Laws

78.7% of respondents indicated that there are environmental bye-laws in the town. These bye-laws are usually enforced by the town council authorities.

SKETCH OF MANKESSIM LAYOUT

Suburbs

Anaafo 4
Obronumu 4
Twafo 3
Old Nkusukum 3
Edumadze 2
New Nkusukum 1
Estate 5
Nananom
Official Town6
Dwenwoho 2
Esikafo Abatem 2
Mantse Mankabi 2
Anhwia Bado 2
Asomowee 2
Zongo 2
School Kessim 4
Ohwirefa 3
Gua Ekyir 4
Garages 1
M.S.T.S 5
Obatanpa 3
Ohwirefa 3

WC- Water Closet
PL- Pan Latrine
STL- Septic Tank Latrine

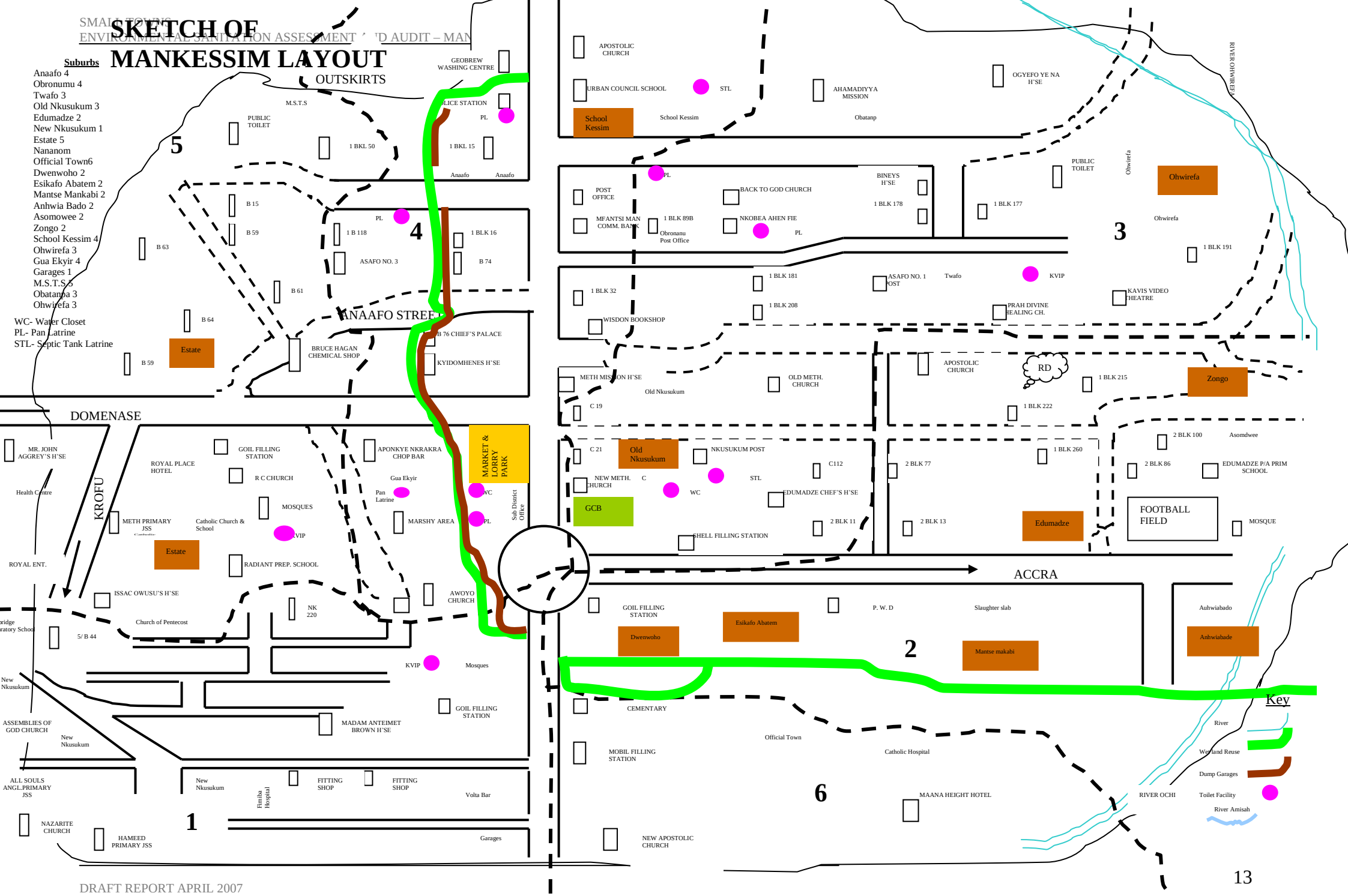


Table 2.1: MANKESSIM COMMUNITY PROFILE

ENVIRONMENTAL CETEGORY	NEW NKUSUKUM	EDUMADZE	SCHOOL KESSIM	TWAFO	ESTATE	MANNA HEIGHTS
WATERSHED MANAGEMENT	• Surface runoff into wetlands	• Pollution of River OKYE with surface runoff and cattle • Sand winning at the banks of River Okye • Flooding by River Okye during rainy season	• Pollution of wetlands by debris carried through surface runoff and disposal of refuse	• Pollution of wetlands with solid waste and surface runoff	• Pollution of wetlands with solid waste at DUKES PETROLEUM STATION	• Pollution of wetlands with runoff water.
WATER SUPPLY	• Pipe borne water supply but tap does not flow	• Pipe borne but tap seldomly flows. • From River Okye	• Pipe borne but tap seldomly flows • Untreated water from River Agege through taps.	• Pipe borne but tap seldomly flows. • Pipe lines run in insanitary drains • Public stand pipe too close to drain	• Pipe borne but tap seldom flows. • Walk to Baifi-krom for water	• No pipe borne water services due to road construction. • Few wells but salty. • Tanker water services
WASTE WATER DISPOSAL	• No treatment prior to disposal • No soak-aways • Stagnant water-breeding of mosquitoes	• No treatment prior to disposal • No soak-aways • Stagnant water-breeding of mosquitoes	• No treatment prior to disposal	• No treatment prior to disposal • No soak-aways • Stagnant water-breeding of mosquitoes	• No treatment • Bath house waste water disposed off through earth drains	• Sullage from bathrooms and kitchen discharged/ disposed off through earth drains
LIQUID (FAECAL) WASTE DISPOSAL	• Household KIVPs • One 12 seater KVIP Public Toilet • No toilet facility for existing school (Anglican school)	• Few household KVIPs • One 12 seater KVIP Public toilet • No toilet facility for existing school	• Household W/Cs • One 4 seater public KVIP • No toilet facility for cluster of schools	• Few Household toilet • One 12 seater public bucket latrine facility • indiscriminate dumping of human excreta • One underground holding tank.	• Indiscriminate dumping • No communal skips	• Indiscriminate dumping • No communal skips • No refuse dump (sanitary) sites • Resort to burning of refuse
SOLID WASTE DISPOSAL	• Indiscriminate dumping • One 15m^3 skip provided.	• Crude dumping sites • One 15 m^3 skip provided • Littering around container	• Indiscriminate dumping • No communal skip	• Indiscriminate dumping behind school (Dorcas Taylor preparatory school) and OBAATANPA Hotel into wetlands • No communal skip	• Indiscriminate dumping • No communal skip	• Indiscriminate dumping • No communal skip • No refuse dump site • Resort to burning of refuse

ENVIRONMENTAL CETEGORY	NEW NKUSUKUM	EDUMADZE	SCHOOL KESSIM	TWAFO	ESTATE	MANNA HEIGHTS
DRAINAGE STORMWATER	• Flood prone Area • Lack of drains • Hilly terrain • Chocked culvert • Perineal muddiness	• Flood Prone • No drains • Chocked culvert • Poor flow of storm water/wastewater through earth drains	• Flood prone • Chocked road drains • Uncovered drains	• Serious drainage problem breeding mosquitoes • Dumping of human excrement in polythene bags • Flood prone due to narrowness of existing public drains	• Chocked culvert at Duke P. Station • Lack of drains at upper parts • Uncovered drains • Perineal flooding at Duke P. Station	• No drains • extensive erosion • stagnation of storm water at same lower parts • no flooding (hilly)
PROMINENT FEATURES	• Poor layout • cluster of garages • fynniba clinic • Volta bar • Anglican school • predominant erosion • Market • Main lorry park • central Business Area (CBA)	• Dilapidated Slaughter Slab with smoke nuisance • poor layout • spockets of undeveloped plots • River bed of river Okye • Mini lorry Terminal	• cluster of schools • Traditional council hall premises • middle class residential Area • Numerous undeveloped building plots. • poor layout • adjumako road network	• Poor layout • dilapidated houses • densely populated • post office premises • Prince Charles clinic (Preko clinic) • Obaatanpa hotel premises	• Poor layout • Conversion of farmland into housing • Vast natural environmental sink-wetlands • reclamation of part of wetland for filling station by Dukes petroleum • Fosu road network • royal palace hotel	• Poor layout • public cemetery • Location of the late President Kwame Nkrumah's Personal dwelling premises. • famous Manna heights hotel premises • Extensive vegetation cover.

2.3 Komenda-Edina-Eguafo-Abirem District

Geography

Location: The Central Region of Ghana

Coordinates: Latitude 5º05´ to 5º15´ North of the Equator and Longitude 1º20´ to 1º40´ West of the Greenwich Meridian

Area: 372.45km^2

Boundaries: The West by Mpohor-Wassa East District, the North by Twifo-Hemang-Lower-Denkyira District, the East by Cape Coast Municipality and the South by the Atlantic Ocean.

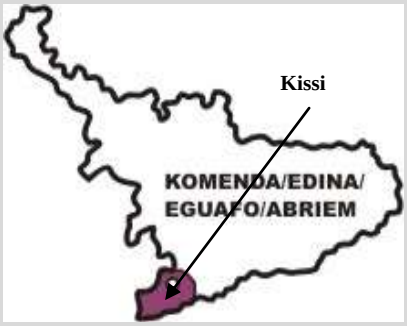
Climate: Mild temperatures ranging from 24 º C to 28 º C
Relative humidity of 85-99% in the morning and 50-85% in the afternoon
Rainfall figures ranges between 750mm to 1000mm in the coastal savanna areas and 1200mm to 1500mm in the interior close to the margin of the forest.

Topography: The landscape of the district is generally undulating dominated by batholiths. Along the coastal zone is a series of lagoons and wetlands, the largest of which include the Benya, Brenu, and Susu Lagoons. These lagoons support a vibrant salt industry.

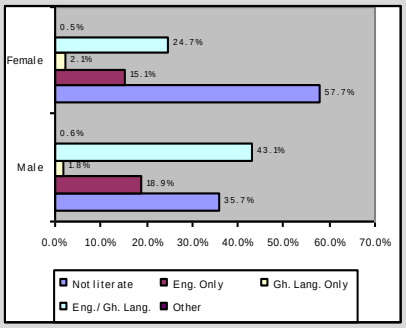
The slopes and hills are steep in inland areas. In between the hills are valleys of various streams, which drain into the coastal lagoon and the Atlantic Ocean. These streams include the Hua and Anta in the west and the Udu and Suruwi in the east.

Natural Resources: *Forest* - wawa, mahogany, odum, kyekyen, edinam, otie, danta, onyina koben
Minerals – Gold, Kaolin, Diamond, Clay, Muscovite Mica, Quartz.

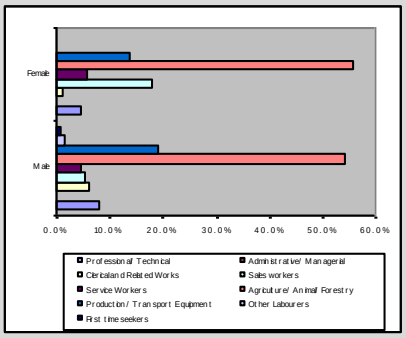
Capital: Elmina



Percentage Distribution of Level of Literacy
(Source 2000 Pop. Census)



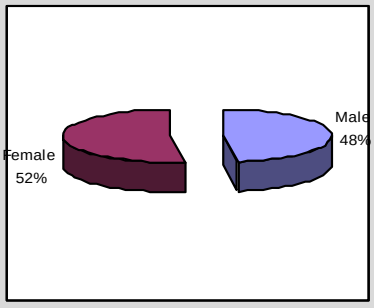
Categories of Occupations



Demographic Characteristics

The population of Komenda-Edina-Eguafo-Abrem (KEEA) District Assembly was 52,216 in 1960 and 64,383 in 1970 producing an inter-censual increase of 23.3%. The growth rate during that period was 2.09%. By 1984 the population of the district was 76,462, which was 6.67% of the region's population. The inter-censual increase between 1970 and 1984 was 18.8%. The national growth rate during that period was between 2.9 and 3.1% per annum. During the 2000 Population and Housing Census, the district population was estimated to be 112,437 (53,755 males and 58,682 females). The ratio of

Percentage Distribution of Population by Sex



males to females is 91.6 to 100. There was an inter-censual increase of 46.5% between 1984 and 2000 and a growth rate of 2.3%. Based on the growth rate, the current estimated population is 131,837 comprising 63,030 males and 68,807 females. The district population constitutes almost 7.1% of the Central Region population.

By current population estimates there are four (4) settlements with population above 5000 which is the CWSA lower threshold for the definition of small towns. Kissi is the smallest of these towns.

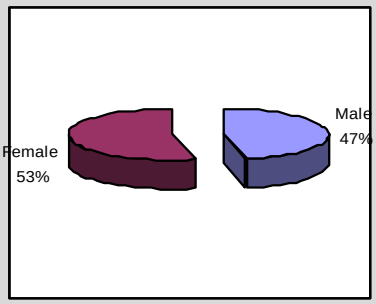
2.4 ENVIRONMENTAL SANITATION PROFILE OF KISSI

2.4.1 Population and Household Data

According to the 2000 population and housing census, Kissi has a population of 4,874 (2,270 males and 2,604 females) with 655 houses. The number of households is 1,208 and the average household size is 4.0. The total number of households interviewed is 120. Based on the 2000 population figure and the district growth rate of 2.3%, the current estimated population of Kissi is 5,715 (2,662 males and 3,053 females).

The total number of households interviewed is 120.

Estimated Current Population Distribution by Sex



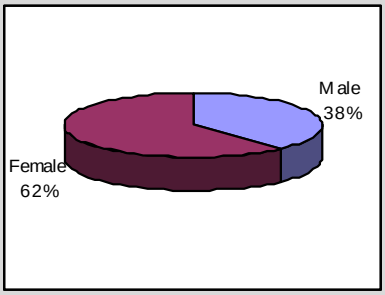
2.4.2 Characteristics of Respondent

On characteristics of respondents, the questionnaire addressed the following

Sex of Respondents

38.0% of respondents were males and 62.0% females.

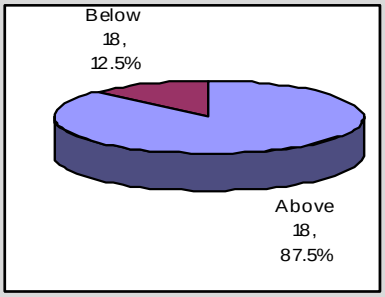
Sex of Respondent



Age of Respondents

87.5% of respondents are above 18 years of age and 12.5% below 18 years.

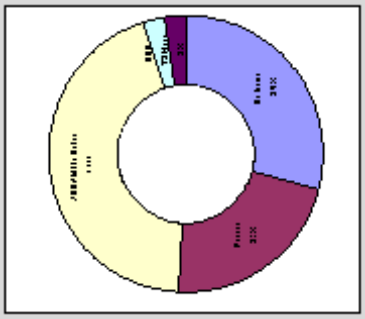
Age of Respondent



Level of education of respondents

2.5% have attained tertiary education level, 2.4% secondary education, 44.2% JSS/Middle school, 21.7% Primary education and 29.2% have no formal education.

Level of Education of Respondent



2.4.3 Potable Water Coverage

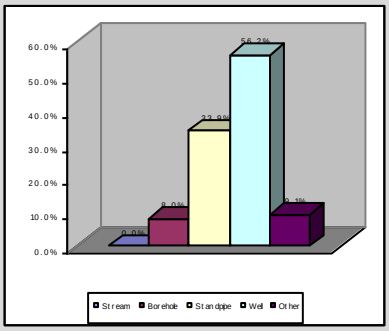
Water Connection

In Kissi, 8.1% of respondents have water connection to their houses. Of these connections, 93.4% are reliable sources. Hence only 7.56% of respondents in Kissi have reliable water connection.

Sources of Water for Drinking

Data from the survey shows that sources of water for drinking purposes include borehole (0.8%), standpipe (33.9%), well (56.2%) and other (9.1%). The other sources include sachet water, tanker services etc.

Sources of Water for Drinking

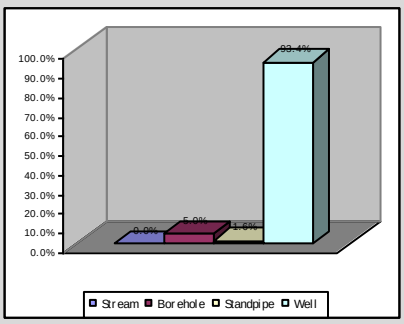


Sources of Water for Other Purposes

Responses from the survey shows that sources of water for other purposes aside drinking include, Borehole (5.0%), standpipe (1.6%) and well (93.4%).

From above 98.4% of the respondents patronize either well or boreholes indicating the presence of groundwater in Kissi. Further studies could be undertaken to investigate the viability of using mechanized boreholes if high yielding aquifer sources can be located.

Sources of Water for Other Purposes



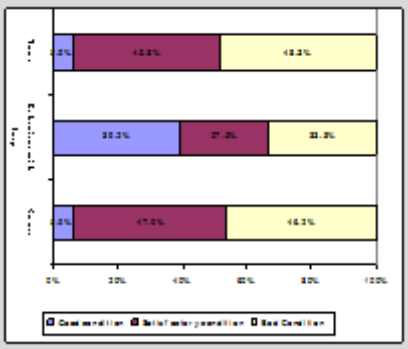
Quality of Water

For salinity, 5.9% of respondents indicated neutral taste of their water, 45.8% slightly salty and 48.3% salty.

With respect to hardness of water, 39.2% of respondents indicated good lathering, 27.5% said water lathers slightly well with soap and 33.3% said water does not lather with soap.

For appearance of water, 5.9% of respondents pointed out the fact that the water was generally clear, 47.9% slightly turbid (coloured) and 46.2% turbid.

Quality of Water



2.4.4 Refuse Management

Household Solid Waste Storage

Data from household survey shows that 7.7% have sanitary dustbins for primary storage of household waste. The receptacles used are not standard and varies from boxes, buckets, cartons etc. If primary collection service (House-to-House or Block) is to be introduced then education campaigns have to be embarked on to raise awareness on the advantages of using standard storage bins.

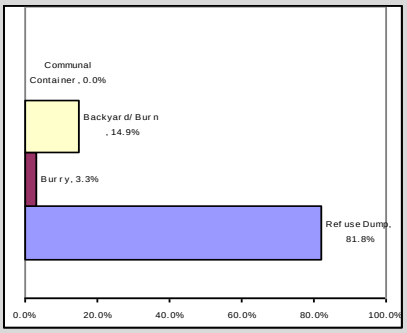
Availability/Access to Refuse Dump Sites

Data from household survey shows that 80.8% have access to uncontrolled dump sites for disposing of their refuse.

Method of Refuse Disposal

Responses from administering questionnaires show that 14.9% throw refuse at backyard and burn, 3.3% burry their refuse and 81.8% use refuse dump sites (uncontrolled dumping). There were no responses on the use of communal containers.

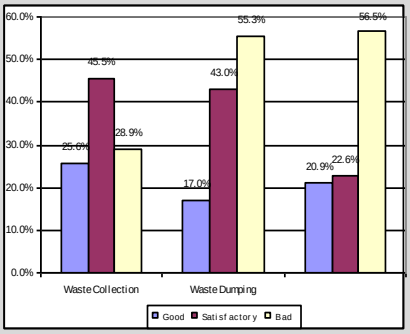
Methods of Refuse Disposal



Perception of Respondents

The residents in Kissi view refuse management as very poor due to the absence of formal refuse collection, indiscriminate dumping and long distances of dump sites to houses. This is supported by prevalence of indiscriminate littering and drains choked with refuse.

Perception of Respondents on Solid Waste Management



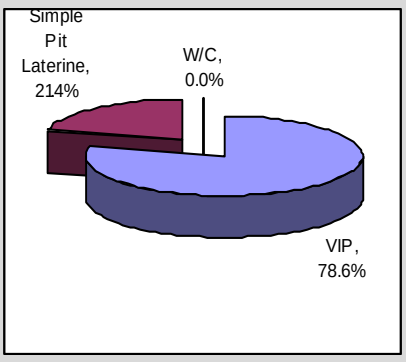
2.4.5 Excreta Management Coverage

In Kissi 12.0% of respondents have a household toilet facility. This clearly shows a deficit in household latrine promotion in the town.

Types of Household Toilet Facilities

Data from the household survey shows 21.4% use simple pit latrines, 78.6% use VIPs and 0.0% use W/C.

Types of Household Toilet Facilities



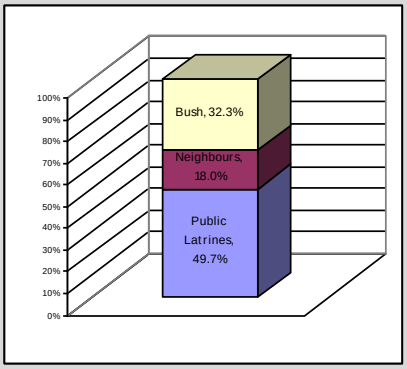
Methods of Excreta Disposal by Households Without Toilet Facilities

Human excreta disposal trends for households without toilets shows that 32.3% defecate in the bush, 18.0% use that of their neighbours and 49.7% use public toilets.

The communal and public toilets include KVIPs, Pan Latrines and Aqua privy. Most of these facilities are in a dilapidated state.

Plate 2.6: Communal Toilet showing erosion of around the base of superstructure

Methods of Excreta Handling by Households without Toilet Facilities



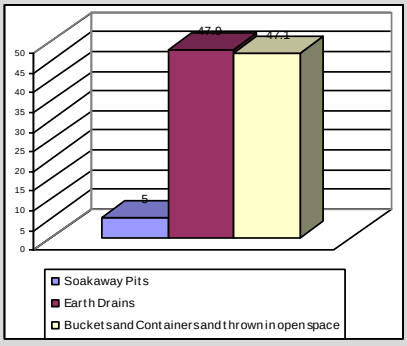
2.4.6 Storm Water and Sullage Conveyance

Storm Water Conveyance

On the issue of flooding, 36.4% of respondents indicated occurrence of flooding whenever there is a heavy down pour. This is supported by the lack of storm drains in the town. The few existing drains in the town are heavily silted and choked with refuse.

Plate 2.7: Circular culvert heavily silted with solid waste

Disposal of Sullage from Kitchen and Bathrooms



Disposal of Sullage from Kitchen and Bathroom

Disposal of sullage from kitchens and bathrooms in Kissi is poor. 5.0% use soakaway pits, 47.9% through shallow earth channels and 47.1% dispose in open spaces.

2.4.7 Health and Personal Hygiene

Handwashing Practices

The responses on handwashing practices in Kissi are shown in the table below:

Hand washing with soap practices	Response	Proportions of Responses (%)
Before food preparation	Always	25.6
	Sometimes	39.7
	Never	34.7
Before meals (eating)	Always	22.5
	Sometimes	59.2
	Never	18.3
After using toilet	Always	37.8
	Sometimes	54.6
	Never	7.6
After attending to defaecation by children	Always	43.7
	Sometimes	34.5
	Never	21.8

General Hygiene Standards in Households and Community

Observations were made in the houses and community on the following

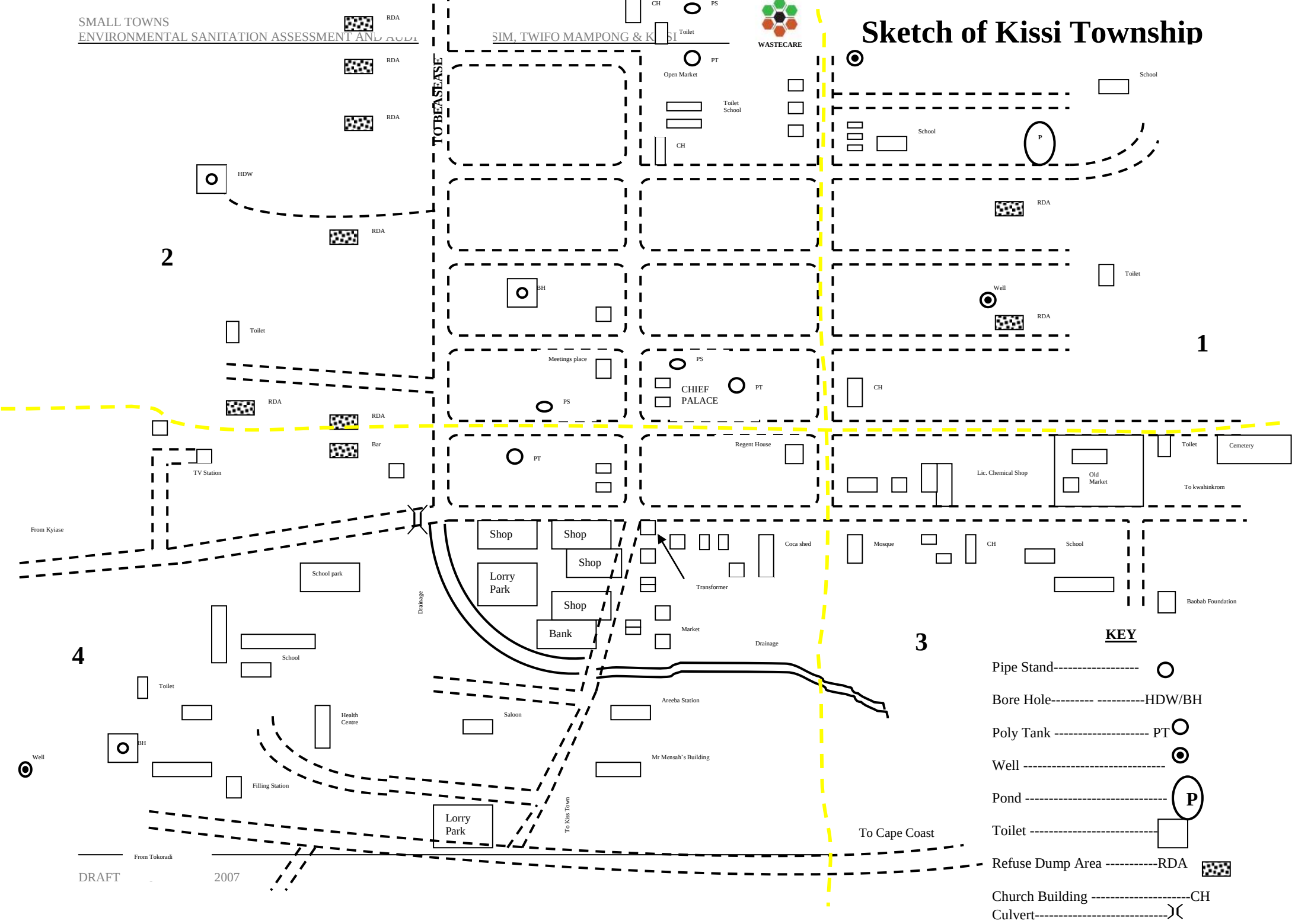
- Use and keep latrine
- Remove animal or children's faeces from the home and safely dispose of them
- Manage and maintain safe, public sanitary solutions (for human and animal waste)
- Consume safe water
- Keep all water containers covered
- Obtain water for drinking/cooking from the least contaminated source available
- Manage and maintain safe, sanitary garbage disposal

The results have been summarised in Table 2.2 below.

Availability of Bye-Laws

85.5% of respondents indicated that there are environmental bye-laws in the town. These bye-laws are usually enforced by the town council authorities.

Sketch of Kissi Township



KEY

Pipe Stand----------

Bore Hole--------- ----------HDW/BH

Poly Tank ---------- PT

Well ----------

Pond ---------- P

Toilet ----------

Refuse Dump Area ----------RDA

Church Building ----------CH

Culvert----------

Table 2.2: KISSI COMMUNITY PROFILE

ENVIRONMENT CATEGORY	DESCRIPTION
WATER SHED MANAGEMENT	• Surface runoff into wetlands • Disposal of distillery waste water into wetlands
WATER SUPPLY	• Pipe borne but tap does not flow (6 Stand pipes) • Water tanker services provided by area council • Unprotected pond used by members of community pigs and ducks
WASTE WATER DISPOSAL	• No treatment prior to disposal • Disposed off through earth drains
LIQUID WASTE DISPOSAL	• 62 unit KVIPs provided in individual premises but schools have no facilities (under construction) • 4 public toilet facilities provided • Public KVIP in deplorable state • Defective chambers
SOLID WASTE DISPOSAL	• Indiscriminate dumping with the aim of reclaiming wetlands • Keeping of pigs at crude dumping sites • Indiscriminate defecation on crude dumps • No communal skips for secondary storage of refuse • No final disposal sites and sanitary sites
STORM WATER DISPOSAL	• Flooding due to dumping of solid Waste in drains • Lack of drains • Chocked culverts • Broken culvert preventing desludging of filled public toilet • Extensive erosion created by storm water runoff
PROMINENT FEATURES	• Poor layout • Akpeteshie distilleries • Erosion of foundation of buildings • Viable market • Final outfall of run off is Dutch-Komenda lagoon or konka lagoon • Old pond (unprotected) have been source of water supply for Kissi all these years. Also used as watering hole for animals (pigs)

2.5 TWIFO-HEMANG-LOWER-DENKYIRA DISTRICT

Geography

Location: The Central Region of Ghana

Coordinates: Latitude 5º50´ to 5º51´ North of the Equator and Longitude 1º50´ to 1º10´ West of the Greenwich Meridian

Area: 1199km^2

Boundaries: The West by Mpohor-Wassa District, the North by UpperDenkyira District, the East by Assin District and the South by Abura-Asebu-Kwamankese District, Cape Coast Municipality and Komenda-Elmina-Edina Aguafo District.

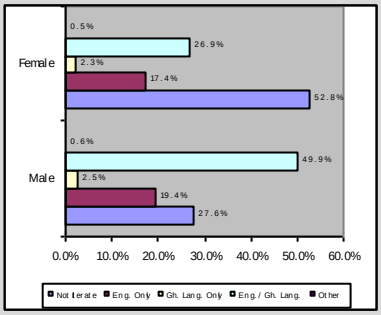
Climate: The district lies within the semi-equatorial zone marked by double maximal rainfall in June and October, with the mean annual rainfall being 175cm. It has fairly high temperature ranging between 70 – 80 percent in the dry season and 75 – 80 percent in the wet season.

Topography: The district consists of a dissected pen plain with average height registering between 76m and 91m and above sea level. The Pra River and its tributaries including Obuo, Bimpong and Ongua drain the area. The drainage pattern id dendritic and has given rise to the dissected nature of the topography

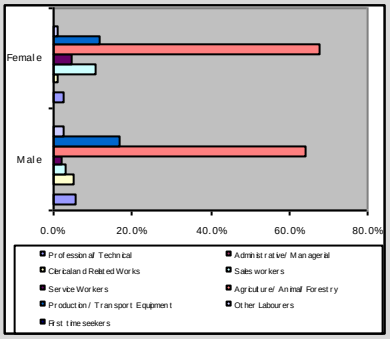
Natural Resources: *Forest* – wawa, mahogany, odum, kyekyen, edinam, otie, danta, onyina koben
Minerals – Gold, Kaolin, Diamond, Clay, Muscovite Mica, Quartz.

Capital: Twifo Praso

Percentage Distribution of Level of Literacy
(Source 2000 Pop. Census)



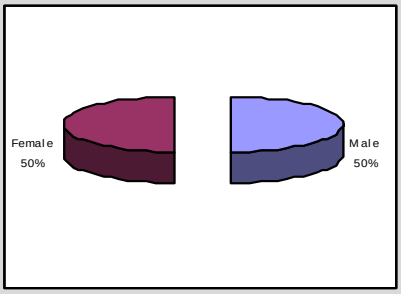
Categories of Occupations



Demographic Characteristics

The population of the district stood at 53,066 in 1970, 95,988 in 1984 and 110,352 in 2000. This makes the population growth rate in the District regional growth rate of 1.8% and a national growth rate of 2.6%. This obviously calls for a serious concern in running population control programmes. The population density for the district has been increasing steadily over the years. In 1970, it was 44 persons per square km. The figure then increased to 80 persons per square km in 1984 and reached 89 persons per square km in 2000. The age-sex structure of the district depicts a situation where males out-number the females until the trend was reversed in the 2000 Population Census count. The high level of male migration for

Percentage Distribution of Population by Sex



jobs could be the reason for this ratio. The sex ratios for 1970, 1984 and 2000 population censuses were 109:100,100:100 and 99:100 respectively. The declining male proportion is attributed to increasing male out-migration since 1970. Based on the growth rate of 2.6%, the current estimated population is 125,030 comprising 62,508 males and 62,522 females.

By current population estimates there are three (3) settlements with population above 5000 which is the CWSA lower threshold for the definition of small towns. Twifo Mampong which is the fourth largest has an estimated population of 3,831.

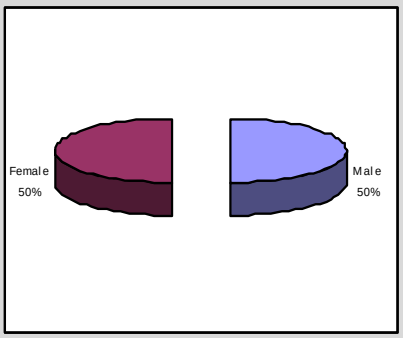
2.6 ENVIRONMENTAL SANITATION PROFILE OF TWIFO MAMPONG

2.6.1 Population and Household Data

According to the 2000 population and housing census, Twifo Mampong has a population of 3,361 (1,681 males and 1,680 females) with 422 houses. The number of households is 864 and the average household size is 3.9. The total number of households interviewed is 120. Based on the 2000 population figure and the district growth rate of 1.8%, the current estimated population of Twifo Mampong is 3,808 (1,905 males and 1,903 females).

The total number of houses interviewed is 120.

Estimated Current Population Distribution by Sex



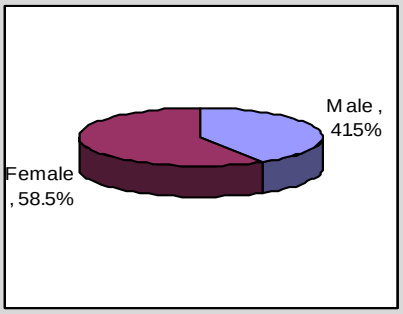
2.6.2 Characteristics of Respondent

On characteristics of respondents, the questionnaire addressed the following

Sex of respondents

41.5% of respondents were males and 58.5% females.

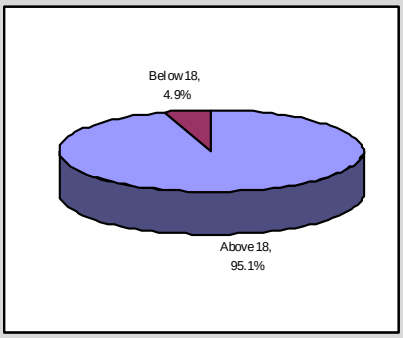
Sex of Respondent



Age of respondents

95.1% of respondents are above 18 years of age and 4.9% below 18 years.

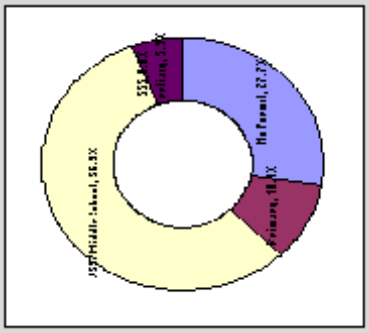
Age of Respondent



Level of education of respondents

5.9% have attained tertiary education level, 56.3% JSS/Middle school, 10.1% Primary education and 27.7% have no formal education.

Level of Education of Respondent



2.6.3 Potable Water Coverage

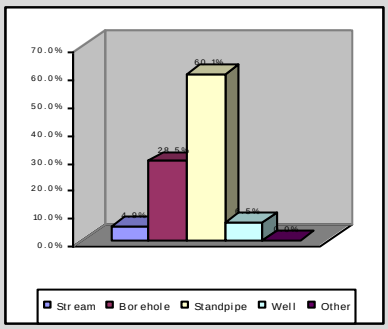
Water Connection

In Twifo Mampong, 25% of respondents have water connection to their houses. Of these connections, 1.6% are reliable sources. Hence only 0.4% of respondents in Twifo Mampong have reliable water connection.

Sources of Water for Drinking

Data from survey shows that sources of water for drinking purposes include stream (4.9%), borehole (28.5%), standpipe (60.1%) and well (6.5%).

Sources of Water for Drinking



Sources of Water for Other Purposes

Responses from household survey shows that sources of water for other purposes aside drinking include, stream (40.7%), borehole (21.1%), standpipe (22.8%) and well (15.4%).

From above 36.5% of the respondents patronize either well or boreholes indicating the presence of groundwater in Twifo Mampong. Further studies could be undertaken to investigate the viability of using mechanized boreholes if high yielding aquifer sources can be located.

Sources of Water for Other Purposes

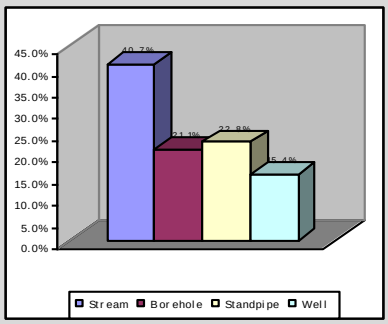


Plate 2.8: High level tank for water storage with an iron removal equipment

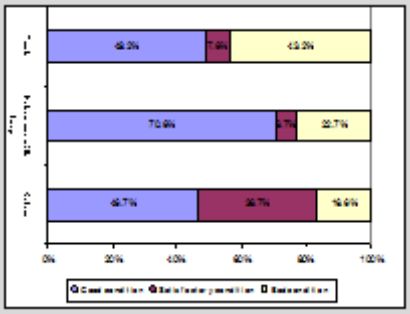
Quality of Water

For salinity, 49.2% of respondents indicated neutral taste of their water, 7.6% slightly salty and 43.2% salty.

With respect to hardness of water, 70.6% of respondents indicated good lathering, 6.7% said water lathers slightly well with soap and 22.7% said water does not lather with soap.

For appearance of water, 46.7% of respondents pointed out the fact that the water was generally clear, 36.7% slightly turbid (coloured) and 16.6% turbid.

Quality of Water



2.6.4 Refuse Management

Household Solid Waste Storage

Data from household survey shows that 6.6% have sanitary dustbins for primary storage of household waste. The receptacles used are not standard and varies from boxes, buckets, cartons etc. If primary collection service (House-to-House or Block) is to be introduced then education campaigns have to be embarked on to raise awareness on the advantages of using standard storage bins.

Availability/Access to Refuse Dump Sites

Data from household survey shows that 59.3% have access to uncontrolled dump sites for disposing of their refuse.

Method of Refuse Disposal

Responses from administering questionnaires show that 42.6% throw refuse at backyard and burn, 9.8% burry their refuse and 47.6% use refuse dump sites (uncontrolled dumping). There were no responses on the use of communal containers.

Methods of Refuse Disposal

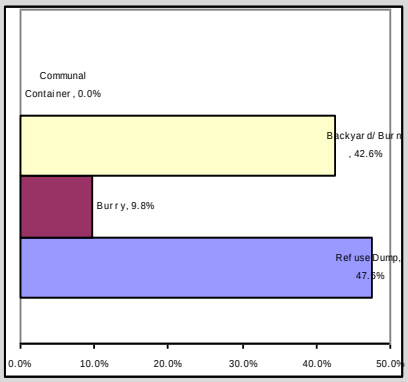
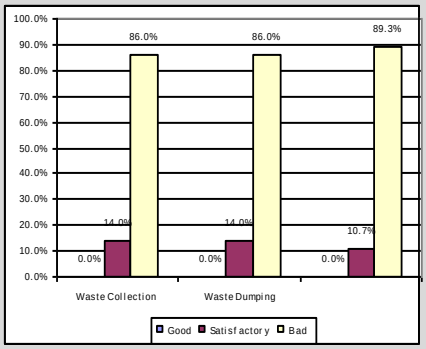


Plate 2.9: Obscured site for uncontrolled dumping of refuse.

Perception of Respondents on Solid Waste Management

The residents in Twifo Mampong view refuse management as very poor due to the absence of formal refuse collection, indiscriminate dumping and long distances of dump sites to houses. This is supported by prevalence of indiscriminate littering and drains choked with refuse.

Perception of Respondents on Solid Waste Management



2.6.5 Excreta Management Coverage

In Twifo Mampong 26.0% of respondents have a household toilet facility. This clearly shows a deficit in household latrine promotion in the town.

Types of Household Toilet Facilities

Data from the household survey shows 33% use simple pit latrines, 67% use VIPs.

Methods of Excreta Disposal by Households Without Toilet Facilities

Human excreta disposal trends for households without toilets shows that 36.5% defecate in the bush, 12.9% use that of their neighbours and 50.6% use public toilets.

The communal and public toilets include KVIPs, Pan Latrines and Aqua privy. Most of these facilities are in a dilapidated state.

Methods of Excreta Handling by Households without Toilet Facilities

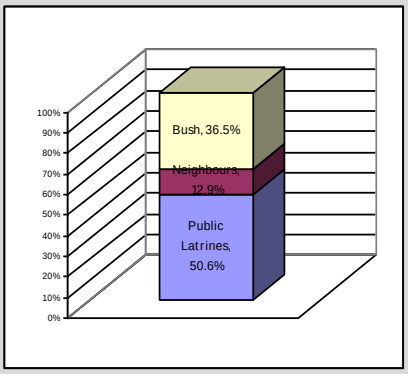


Plate 2.10: Demolished 20 seater public toilet.

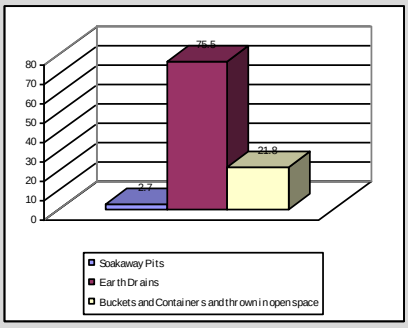
2.6.6 Storm Water and Sullage Conveyance

Storm Water Conveyance

On the issue of flooding , 41.8% of respondents indicated occurence flooding whenever there is a heavy down pour. This is supported by the lack of storm drains in the town. The few existing drains in the town are heavily sited and choked with refuse.

Plate 2.11: Storm drainage under construction by the community (with support from WSDB)

Disposal of Sullage from Kitchen and Bathroom



Disposal of Sullage from Kitchen and Bathroom

Disposal of sullage from kitchens and bathrooms in Twifo Mampong is poor. 2.7% use soakaway pits, 75.5% through shallow earth channels and 21.8% dispose in open space.

2.6.7 Health and Personal Hygiene Coverage

Handwashing Practices

The responses on handwashing practices in Twifo Mampong are shown in the table below:

Hand washing with soap practices	Response	Proportions of Responses (%) Twifo Mampong
Before food preparation	Always	30.1
	Sometimes	5.7
	Never	64.2
Before meals (eating)	Always	26.0
	Sometimes	14.6
	Never	59.4
After using toilet	Always	87.0
	Sometimes	5.7
	Never	7.3
After attending to defaecation by children	Always	45.1
	Sometimes	9.8
	Never	45.1

General Hygiene Standards in Households and Community

Observations were made in the houses and community on the following

- Use and keep latrine
- Remove animal or children's faeces from the home and safely dispose of them
- Manage and maintain safe, public sanitary solutions (for human and animal waste)
- Consume safe water
- Keep all water containers covered
- Obtain water for drinking/cooking from the least contaminated source available
- Manage and maintain safe, sanitary garbage disposal

The results have been summarised in Table 2.3 below.

Availability of Bye-Laws

98% of respondents indicated that there are environmental bye-laws in the town. These bye-laws are usually enforced by the town council authorities.

SKETCH OFTWIFO MAMPONG LAYOUT

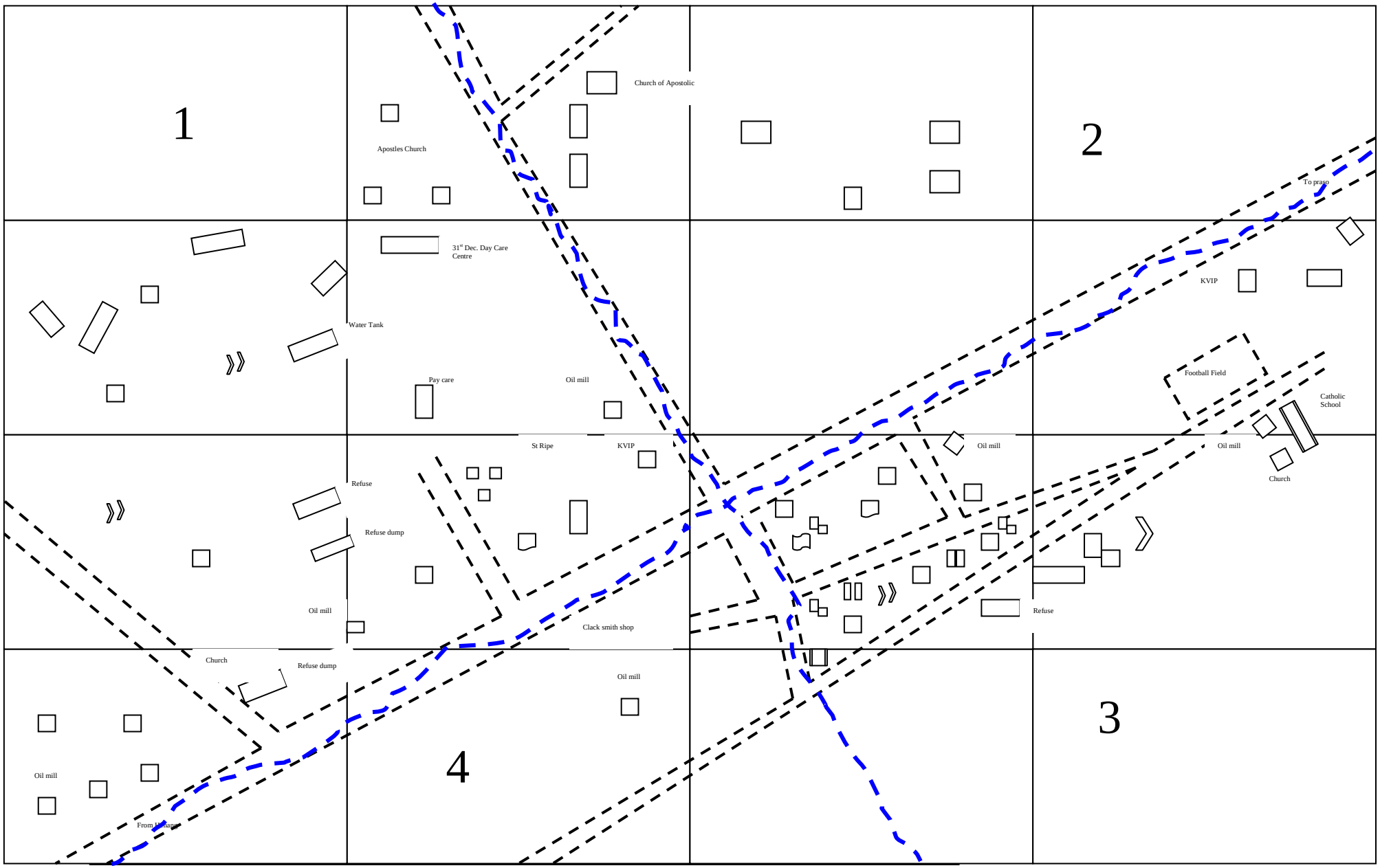


Table 2.3: TWIFO MAMPONG COMMUNITY PROFILE

ENVIRONMENT CATEGORY	DESCRIPTION
WATER SHED MANAGEMENT	• Surface runoff into wetlands • Disposal of waste water from oil mills
WATER SUPPLY	• Provided with small town water supply • Water pumped into overhead tank (galvanized) with the aid of electrically driven hydrolic machine • 4 stand pipes (public) but salty • 4 boreholes provided (one abandoned to cost of repairs and its salinity and high iron content. • Only two houses (premises) has been able to connect water (Weeds extension) • Institution of WSDB to manage water supply issues
WASTE WATER DISPOSAL	• No treatment prior to disposal • Disposed off through earth drains • Waste water from oil mills go to streams
LIQUID WASTE DISPOSAL	• Lack of household toilets • Indiscriminate defecation • Only one public KVIP provided • Only few schools have got toilet facility
SOLID WASTE DISPOSAL	• Only two crude dumps provided and managed with communal labour by burning • No CWC. The only one provided has been taken away by the THLDDA • Salvaging of scraps and play toys by children • Piles of refuse at oil palm mills • Smoke nuisance through burning of refuse
STORM WATER DISPOSAL	• Flooding • No drains at some parts (numerous deep earth) • Erosion (extensive) • Outfall of drain are streams (palm oil mill use streams)
PROMINENT FEATURES	• Poor layout • Water Board in place • Numerous oil palm mills • Oil palm farmers • Stone Winning • Good communal spirit and community mobilization

3 RECOMMENDATIONS

From the environmental sanitation assessment and audit and the town profile, the following interventions are recommended:

- Improvement in drainage scheme
- On-site sanitation improvement programme
- Solid waste management improvement programme
- Improvement of wetland management
- Management support

4 CONCLUSION

Details of the interventions mentioned are discussed in the Town Environmental Sanitation Development Plans (TESDPs) which gradually introduces a means of providing integrated interventions to address issues confronting small and medium-large towns.

WASTECARE

ANNEX 1: STRUCTURED HOUSEHOLD QUESTIONNAIRE FOR DATA GATHERING

ENVIRONMENTAL SANITATION ASSESSMENT AND AUDIT

NAME OF DISTRICT:	TOWN/ AREA COUNCIL:	
COMMUNITY	POPULATION:	
NAME OF ENUMERATOR:	DATE	

NAME OF RESPONDENT:

AGE:	EDUCATION	BASIC	SECONDARY	TERTIARY
SEX:				

1 SOLIDWASTE MANAGEMENT

1a	Do you have access to a refuse dump?						
1b	Do you have Sanitary Dustbin for storage of refuse?		Yes	No			
	if Yes						
1c	Who disposes off the refuse?	Adults	children				
	if No						
1d	where do you dispose of your refuse?	refuse dump	burry	burn	back yard	Communal Container	other(specify)
1e	What do you do with food residue,peels of yam,plaintain,corn,cocoyam		refuse dump	for domestic animals	thrown at the back yard	hole for composting	other
1f	What is the distance from here to the refuse dump?		close	far	very far		
1g	Is the refuse dump close to a water body?		Yes	No			
	if Yes						
1h	What happens when it rains?						

1i How would you grade the waste management system in this community?

	waste collection	waste dumping	distance from the waste dump	other
Bad				
Satisfactory				
Good				

2 LIQUID WASTE

2a	Do you have toilet facility in your house?	Yes	No				
	if Yes						
2b	what is the type of toilet facility	KVIP	W/C	Pit Latrine	Pan Latrines	Bush	Other
	if No						
2c	where do you ease yourself?	Public KVIP	Public W/C	Public Pit Latrine	Public Pan Latrines	Bush	other
2d	How far is the toilet facility from where you live?						
2e	What is done when the facility is full?	Dig a new pit	Go to the bush	dislodges	other		
2f	Are the public toilets close to water bodies?	Yes	No				

3 WATER SUPPLY MODULE

3a	Do you have water connection to your house?	Yes	No			
	if Yes					
3b	Is it Reliable?	Yes	No			
	if No					
3c	Where do you fetch drinking water?	stream	borehole	stand pipe	well	
3d	Where do you fetch water for other purposes?	well	stream	borehole	stand pipe	
3e	Who usually fetches water for household use?		Adult	children		
3f	How far away is the main source of water supply?					
3g	How far away is the alternative source of water supply?					
3h	Are the yield of the ground/surface water sufficient?			Yes	No	
3i	What happens to these sources during the dry seasons?		reduce in volume			
			volume sufficient			
			dry up			
3j	Is the colour of the surface/groundwater water good?		Yes	No	slightly	
3k	Does the surface/ground water taste salty?		Yes	No	slightly	
3k	Does the surface/ground lather well with soap?		Yes	No	slightly	

4 STORM WATER CONVEYANCE SYSTEM

4a	Do you experience Flooding when it rains?			Yes	No
	If Yes				
4b	How long does it take for the water to drain away?	1/2hr	1hr	1.5hr	2hrs
4c	Do you have drains that convey the storm water?			Yes	No
	If Yes				
4d	Are they covered or opened?				
4e	Are the drains cleansed periodically?	Yes	No		
	If Yes				
4f	Who is responsible?				
4g	What in your opinion causes the flooding?	choked gutters	lack of drains	building in waterways	
4h	what are some of the impacts of flooding?				

5 INDUSTRIAL, MARKET, SCHOOL WASTE MANAGEMENT

5a	What type of waste do you generate.	organic			
		inorganic			
		toxic			
5b	What type of hazardous waste generated (specify)				
5c	How do you dispose off your industrial waste	add to communal waste			
		incenerate			
		burry			
		recycle			
5d	Do you treat your waste water before disposing it off?	Yes	No		
	if Yes				
5e	what type of treatment?please specify				
	if No				
5f	Where does your waste water go?	streams	soakaway	drains	bucket

6 MEDICAL WASTE

6a	What type of waste do you generate. (Tick as many as applicable)	plastics		kitchen waste	
		metals		glass	
		papers		toxic waste	
		polythene		human parts	
6b	How do you dispose of these waste?	incenerate			
		burry			
		recycle			
		add to communal waste			
6c	where do you dispose off your wastewater	stream			
		soakaway			
		drains			
		other			
6d	Do you treat your waste water ?	Yes	No		
	if Yes				
6e	what type of waste treatment? Please state				

7 HANDWASHING PRACTICES

7a Do you wash your hands with water and soap (or other cleaning agent) before preparing food?

Always		Sometimes		Never	

7b Do you wash your hands with water and soap (or other cleaning agent) before eating?

Always		Sometimes		Never	

7c Do you wash your hands with water and soap (or other cleaning agent) after use of toilet?

Always		Sometimes		Never	

7d Do you wash your hands with water and soap (or other cleaning agent) after helping/cleaning children after defecation?

Always		Sometimes		Never	

8 HEALTH INFORMATION

8a	Are you aware of any predominant disease(s) in your community?	Yes	No		
	If Yes, kindly state it (them):				
8b	What period does/do it/them occur(s):				
8c	Do you have Health Facility in your community?	Yes	No		
8d	If "No" where do you treat such disease(s)?				
	Chemical sellers				
	Traditional healers				
	Faith based healers				
	Other (state)				
8e	Vectors considered prevalent in household/community	housefly	mosquito	tsetsefly	

9 Animal waste disposal

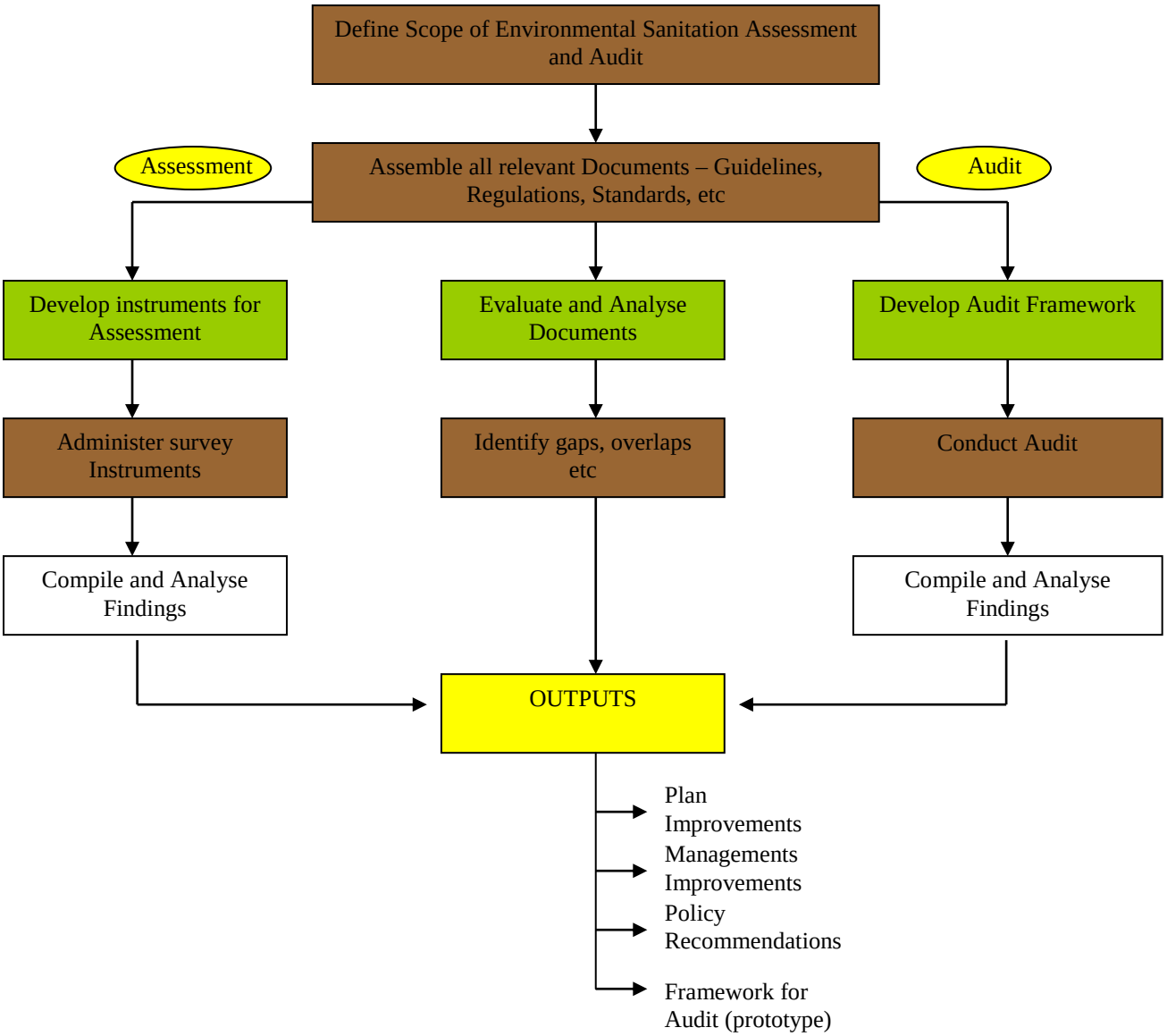
9a	what is the main occupation in this community?	farming	fishing	lifestock rearing	trading
	if Lifestock rearing				
9b	What system is adopted in rearing these animal?	intentive			
		semi-intensive			
		extensive			
	if intensive				
9c	How is the animal waste dispose	used as manure			
		bury			
		other (state)			
	if Extensive				
9d	Are there a lot of stray animals in the community?	Yes	No		
9e	What is the impact of stray animals on the community?				

10 Availability of bye laws

10a	Do you have Environmental laws in your	Yes	No
	If Yes		
10b	Who is responsible for law enforcement in this community	Town council	
		Metro Assem	
		Sub Metro	
		municipal	
		district assem.	
	If No		
10c	What is the community doing to keep its environs clean		

ANNEX 2: FRAMEWORK FOR CONDUCTING ENVIRONMENTAL SANITATION ASSESSMENT AND AUDIT

FLOW CHART FOR ENVIRONMENTAL SANITATION ASSESSMENT AND AUDIT



ANNEX 3: LIST OF PERSONS MET FOR CONSULTATIONS, FGDS AND KPIS

No.	Name	Position/Designation
Mfantseman District Assembly		
1.	Hon. Robert Quainoo-Arthur	District Chief Executive
2.	Keneth Arhin	DEHO
3.	K. Buckman	District Town and Country Planning Office
4.	Robert Arthur	EHA/DWST
5.	Mr. Otu Roberts	District Technical Officer, ECG Saltpond
Mankessim Sub-District Office		
6.	Patrick Sam Mensah	EHA
7.	Thomas Oduro	EHA
8.	Beverly Torkoebu	EHA
9.	Faustina Mensah	EHA
10.	Kojo Amadu	Revenue Collection Officer
11.	Kojo Anderson	Assemblymember, Edumadze Twafo
Mankessim – Community Dialogue, Traditional Rulers, Assemblymembers, Opinion Leaders		
12.	Nana Obaataan III	Omanhene
13.		Assemblyman Nkusukum Electoral Area
14.	Obaahemaa	
15.		Assemblyman Edumadze Twafo Electoral Area
16.	Major (rtd)	
17.	Sgt(rtd)	
18.		
19.		
20.		
21.		
22.		
Komenda Edina Eguafo Abirem District Assembly (KEEA)		
23.	Saaka Dramani	District Coordinating Director
24.	Habib Mohammed	District Planning Officer
25.	James Gmakame	DEHO
26.	Fastoway	
27.	Emmanuel Annang	EHA
28.	Hayford Appiah	EHA
29.	Isaac Ampomah	DWST,Community Development Officer
30.	David Amoah	Building Inspector
31.	Yemofio Odoi	Building Inspector
Kissi - **Community Dialogue, Traditional Rulers, Assemblymembers, Opinion Leaders**		32.
32.	Nana Amaning	
33.	Okyeame Kow Atta	
34.	Okyeame S.K. Mills	
35.	Andrews Essuman Prah	Assemblyman, Kissi East
36.	Rockson Awotwe Arthur	Assemblyman, Kissi West
37.	Haruna Yussif	Unit Committee Member
38.	Ebusuapayin Apagya	
Twifo Heman Lower Denkyira District Assembly (THLDDA)		
39.	Hon. Yaw Agyeibi-Kessie	District Chief Executive
40.	George Boadi	DEHO
41.	Charles Opoku	District Planning Officer
42.	Francis Edusei	EHA
43.	Isaac Entsiey	EHA, DWST
44.	Marian Bedzo	EHA

Twifo Mampong – Community Dialogue, Assemblymembers, WSDB		
45.	Monica Esi Amos	WSDB
46.	Martin K. Arhin	Assemblymember
47.	Castro Amo	Unit Committee Member
48.	Appiah-Kubi F.	WSDB
In Attendance at Community Dialogues (Mankessim, Kissi and Twifo Mampong)		
	Issaka Balima Musah	CWSA
	Richard Agyarko	CWSA
	Evans Darko-Mensah	WasteCare
	D. Opare	WasteCare
	Lukman Salifu	WasteCare
In Attendance at Presentation of Initial Findings		
	Issaka Balimah Musah	ESS, CWSA-CR
	Nana Mburaenu Edumadze V	Mankessim Representative
	Martin K. Arhin	Assemblymember, Twifo Mampong
	Kevin Gallagher	Adviser
	Robert Arthur	DWST, Saltpond
	Joseph Asante	WSE, CWSA-CR
	Leticia Ackun	ESS, CWSA-CR
	Raphael Nyanke	EHA, Praso