TABLE OF CONTENTS

PAGE NO.

1. INTRODUCTION

1.1 Background

The Philippines has frequently suffered from annual flooding and landslides mainly caused by typhoons while the government has continuously endeavored to mitigate the damages. Such disasters have brought heavy losses to the country's economy and claimed hundreds of lives every year. Approximately 700 lives have been lost and damages have amounted 8.1billion pesos annually. It has affected primarily agricultural productions, transportation and communication resulting in aggravated and long time economic depression, and enlargement of regional differential and influx of the poor to the urban areas. The Government of the Republic of the Philippines has hardly mitigated or prevented the disasters due to its limited technical background, organization structures, regulations as well as budgetary constraint.

Hence, the Government has requested a technical cooperation project to develop the capacities of engineers by means of establishing "Flood Control and Sabo Engineering Center" to the Government of Japan. In response to the request, Japan International Cooperation Agency (JICA) has started "The Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of the Department of Public Works and Highways" on January 10, 2000. The Project has been implemented with the objective of enhancing the capabilities of the engineers of the DPWH at the regional offices.

While the Project is now under the Stage 2 (10 January 2003 to 30 June 2005), DPWH engineers are trained for structural designing/planning through the On-the-Job Training (OJT) and construction supervision and maintenance until June 2005. It is envisaged that the counterpart personnel who are participating in the current training will echo the program to the field engineers of other DPWH regional offices.

Likewise, Study titled "***Study on Flood Control Project Implementation System for Principal Rivers in the Philippines*** "on possible reforms and improvement for effective flood control project implementation system is started in parallel with the on-going training program.

1.2 Scope of Works

The above Works will be undertaken on the following pre-selected river basins namely;

- Marikina River
- Upper Marikina River
- Pansipit River
- Panaysayan River
- San Cristobal River

Location of the said river basins is shown in **Annex A** *(Figures)*.

1.3 Duration of Works

The Works was started in 2nd week of July 2004 and about to be completed on August 2004.

2. EXPECTED OUTPUT

2.1 General

The discharge observation will be carried out at the five (5) pre-selected principal rivers in Region IV-A and NCR in the Luzon Island where there are existing installed staff gauges for water level observation and currently operational as listed below.

Rivers	Location	Drainage Area
Lower Marikina	Sto. Nino, Marikina – (1959-1970), (1986-2000)	518 sq. km
Upper Marikina	San Jose, Montalban Rizal – (1988-1998)	277 sq. km
Pansipit	Ignacio Ilagan, Taal Batangas	732 sq. km
Panaysayan	Palubluban, General Trias, Cavite (1959-1976), (1982-1999)	29 sq. km
San Cristobal	San Cristobal, Calamba, Laguna – (1984-1999)	129 sq. km

The locations of the observation points for each river are set to be within the vicinity of the existing water level staff gauge as shown in Annex A *(Figures).*

2.2 Expected Output

As shown from the table below is a sample result from velocity measurement. The observation form includes the river name and location, water level, current weather condition, physical observation of the vicinity such as topography, geology, proximity to the sea for tidal effect and social conditions, date of measurement, time start and the computation table. The recorded water level at the time of observation together with the cross section of the river can calculate the cross sectional area of the channel during the observation. With the calculated cross sectional area and the observed water velocity, discharge at the observation point will be approximated. It is important to include the time in measuring due to the rise and low of water level. The accuracy of measurement can affect due to the conditions of weather and the surroundings of the river.

The computation table indicates the weight of the float, time, time traveled and the float current. The weight of float used is discussed in 2. Float current can be measured by measuring the time such float takes to travel first observation point and to the last observation point over a known distance, estimate of the velocity can obtain. Repeating the float measurement over the same stretch will give an average estimate of current. Velocity can be computed to the distance traveled by float divided by the total time traveled. Average velocity is equal to the distance traveled by float divided by the average time traveled.

$$\mathbf{V = D_{travelled} / T_{total}}$$

$$\mathbf{V_{average} = D_{travelled} / T_{average}}$$

The calculation above used in determining of estimating stream flow where discharge is equal to cross-sectional area multiply by mean velocity.

$$Q_{streamflow} = A_{cross\text{-}section} \times V_{mean}$$

Table below represents as a Sample Observation Form.

OBSERVATION FORM

RIVER NAME: *Marikina River*
Location: *Sto. Nino, Marikina City*
Water Level: *12.80 meter*
Weather: *Sunny*
Surrounding Observation: *Presence of Barge*
Date of Measurement: *August 3, 2004*
Time Start: 11:05 AM

CURRENT MEASUREMENT USING FLOAT

Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	11:05 AM	33.00	11:06 AM	30.00	0.9091
2	0.90	11:06 AM	28.00	11:07 AM	30.00	1.0714
3	0.90	11:08 AM	36.00	11:09 AM	30.00	0.8333
4						
5						
6						
7						
					Average Current (m/s) =	0.9278

3. EQUIPMENT AND METHODOLOGY

3.1 General

There are various methods used in measuring the current velocity. Devices and other types of equipments like current meters, cone and rubber bag method and float method are mostly used for determining stream flow.

A current meter is the best-known and more accurate determination of velocity. It measures the velocity at a single point, and several measurements are required to calculate the total flow. The average velocity at a single point of measurements is estimated from the mean of the velocity measured at 0.2 and 0.8 of the depth. For shallow water a single reading is taken at 0.6 of the depth instead of averaging the readings at 0.2 and 0.8 of the depth. This device is expensive but it is most accurate in all of methods.

Cone and rubber bag method is a simple inexpensive device for measuring current velocity. This device is made with a truncated cone with small opening which has a rubber bag attached to its base. It is helpful if a clear, open-ended plastic cylinder surrounds the bag. A suitable cone is a small, plastic garden hose attachment. Balloons are suitable rubber bags. It is easily attached to the garden hose cone using the rubber washer that is supplied with the cone.

Another method is to pour into the stream a quantity of strongly colored dye. It is measured for the first and last of the dye to reach the measuring point and an average of the two times is used to calculate the average velocity. In turbulent flow, the dye is dispersed quickly and difficult to observed and measure resulting to in accurate reading.

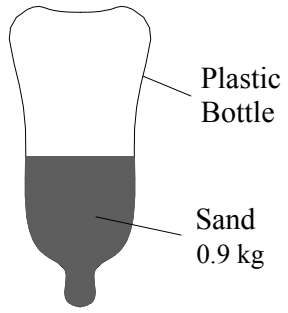
The float method which is used in this Study is the safest, simplest and cheapest method. The system will require only a floating material and a timer to approximate the velocity of the water in the channel. By repeating the method, rough estimate of the average flow velocity in the channel is immediately attained. Below are the typical examples of floats used, which includes their respective characteristics and specifications.

3.2 Equipment Used

Float is the simplest equipment for measuring river velocity. Even observers are not highly skilled or do not have a current meter available, reading of gage height and float velocity can provide a valuable record of river flow. By using a stopwatch, measuring tape, leveling rod, transit and 2 or more floats are all required to find the velocity of the river. Figures below are the three kinds of float used for velocity measurement.

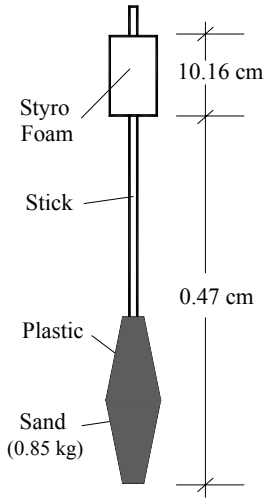
Float 1

It is made of a plastic bottle containing sand to stabilize the vertical movement of the float. The weight of the sand is determined prior to fieldwork by calibrating the submergence of the float such that an inch of the float shall be above the water line. About 0.90 kg of sand is found to meet the said requirement. Normally, the system is used in a shallow river with a depth less or equal to one (1) meter.



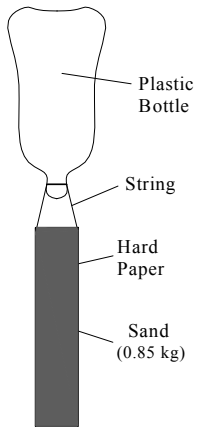
Float 2

It is made of a 1" x 1" wooden stick, cylindrical styro foam which served as the float and sealed plastic cups containing sands for vertical stability. The weight of the sand is determined prior to field work by calibrating the submergence of the float such that the top side of the float shall level with the water line. About 0.85 kg of sand is found to meet the said requirement



Float 3

It is made of a plastic bottle as float and hard paper tube containing sand for stability. The weight of the sand is determined prior to fieldwork by calibrating the submergence of the float such that an inch of the float shall be above the water line. About 0.90 kg of sand is found to meet the said requirement. Normally, the system is used in a shallow river with a depth less or equal to one (1) meter.



(B)

Theoretically, the velocity distribution along the depth of the channel varies with fastest velocity near the surface and slowest at the sides and bottom of the channel. Float 2 and 3 are used to measure below the surface where the float and weight move down the stream together at the velocity of the stream at the depth. This method used to measure the approximate average velocity for the whole river.

Pictures of the equipment used shown in the **Annex C** *(Photographs).*

3.3 Methodology

3.3.1 Survey Team

In performing a float method survey for current velocity a team was made which comprise of Team Leader, Assistant Leader, Floatman, and 4 Rodman.

The team leader directs general affairs concerning the measurement, measures the time it takes the floats to pass from the first observation line to the second observation line, makes contact with the offices and determines the observation date and time.

Assistant leader measures the water level at the standard staff gauge and the first and second observation line staff gauge during measurement periods and on a regular basis he's the one responsible for setting up all the necessary markers especially the current measurement line.

Floatman lowers the floats into water at prescribed places; observers flowing condition.

Rodman will serve as first and second observation line.

3.2.2 Setting-Up the First and Second Observation Line

- The assistant team leader measures 30 meters from the first observation point line up to the second point along the bank of a straight section of the selected river
- Using a transit, from the first observation point line up to the second point a 90^o turn was set in place facing the opposite bank of the river to form a right angle which will serve as third point then the transit was placed on the second point facing the first point then a 90^o turn was made which will be the fourth point.

3.2.3 Releasing the Float

- After marking up all the observation point, the four rodman stands at each point. Then release the float at the upstream site in 5 - 10 m distance before the starting point. Float should travel a long patch with no turbulence or flow stagnation, no obstruction or affected by wind.
- Using stopwatch, record the time it takes from the starting point and to reach the ending point.
- Repeat the measurement two or more times for an accurate measurement
- Calculate the velocity as distance traveled divided by the average time it took the float to travel the distance.
- Record the reading depth of gauging station at the location of measurement to be used in estimate stream flow.

Pictures are illustrated in **Annex B**.

4. LOCATION AND GENERAL CONDITIONS OF TARGET AREAS

4.1 General

This section of the Draft Report describes the location and general conditions of five discharge observation sites on the principal rivers in Luzon Region under The Study on Flood Control Project Implementation System for Principal Rivers in the Philippines (FCPISPR). The prevailing conditions of the five discharge observation sites are among the considerations taken into account in preparing the FCPISPR methodology and approach to the services. Appreciation of the existing conditions set the grounds for the study areas.

4.2 The Target Areas

The Target Area falls within five principal rivers three sites will be outside from National Capital Region (NCR) and two sites inside National Capital Region where the water level gauging station is present. Panasayan River, Pansipit River, and San Cristobal River are among the selected principal rivers outside from NCR and one site from Marikina and Upper Marikina River are consider inside NCR.

A location of target areas is shown in **Annex A** *(Figure 4.0).*

Marikina River

Location of target and gauging station area are located at Sto. Niño bridge in Barangay Sto. Niño, Marikina City. See **Annex A (*Figure 4.1)***

Upper Marikina River

Location of target area and gauging station are located at the bridge of San Jose, Montalban, Rizal. See **Annex A (*Figure 4.2)***

Pansipit River

Location of target area and gauging station are located at Brgy. Poblacion, San Nicolas Batangas. Just above bodega of Ignacio Ilagan and at the lower corner of the rice field abutting on the river. Standard metric gage vertically nailed to column of adobe wall at left bank of the river. See **Annex A (*Figure 4.3).***

Panasayan River

Location of target area in Panaysayan River and gauging station is located about 6 kms. South of the Municipality of Gen. Trias, Barangay Palubuhan, Province of Cavite (Latitude 14^{o}22’22”, Longtitude 120^{o}52’55”). On the downstream side of the Palubuhan bridge and about 1 km. of the confluence of the Panaysayan and Palubuhan Rivers. It has a drainage area of 29 sq. kilometers. See **Annex A (*Figure 4.4)***

San Cristobal River

Location of target area and gauging station are located at Brgy. San Cristobal, Calamba Laguna. See **Annex A (*Figure 4.5)***

4.3 Flooding Conditions

The target areas constantly experience high tides, which sometimes causes flooding due to heavy storm particularly in some low portion of Montalban, Marikina and Cavite.

4.4 Environmental Conditions

The environmental conditions in the target area, particularly the San Cristobal River and peripheral areas are far from ideal. Floating debris, murky and stinky waters and garbage dumps are a common sight along the banks. Informal settlers occupy a portion of the waterways and their banks. No valuable flora and fauna could be found within the areas except for a few ornamentals that have been planted in some areas.

4.5 Socio-Economic Conditions

The target area focused on the principal river in Luzon Region. As such, the communities within the Study area have relatively easy access to most social services such as elementary, secondary and tertiary schools; hospitals and clinics; water and power connections, markets and department stores and leisure areas. However, the target area also has a high percentage of urban poor living in informal settlements that abound near the banks of rivers.

5. RESULTS OF CURRENT OBSERVATION

5.1 Marikina River

The location of observation site as shown in Figure 4.1 is located at barangay Sto. Nino gaging Station, Marikina City. The calculations for the velocity measurements using float A and B is tabulated below where:

Average V elocity = Distance x Average time

Other observation data shown in **Annex D** *(Observation Results).*

Used float: Float 2

July 31, 2004

Trial	Time Recorded (s)	Distance (m)
1	78.75	30
2	63.19	30
3	64.36	30

Average Time = **68.77 s**
Average Velocity = 30/68.77 = **0.4362 m/s**

August 3, 2004

Trial	Time Recorded (s)	Distance (m)
1	32.00	30
2	32.00	30
3	34.00	30

Average Time = **32.67 s**
Average Velocity = 30/32.77 = **0.9155 m/s**

Used float Float 3

July 31, 2004

Trial	Time Recorded (s)	Distance (m)
1	90.00	30
2	68.94	30
3	59.00	30

Average Time = **72.64 s**
Average Velocity = 30/72.64 = **0.4130 m/s**

***August 3**, 2004*

Trial	Time Recorded (s)	Distance (m)
1	33.00	30
2	28.00	30
3	36.00	30

Average Time = **32.33 s**
Average Velocity = 30/32.33 = **0.9279 m/s**

5.2 Upper Marikina River

The location of observation site as shown in Figure 4.2 is located at barangay San Jose gaging Station, Montalban, Rizal. The calculations for the velocity measurements using float A and B is tabulated below where:

Average V elocity = Distance x Average time

Other observation data show in **Annex D** *(Observation Results).*

Used float: Float 2

July 26, 2004

Trial	Time Recorded (s)	Distance (m)
1	39.27	30
2	33.72	30
3	21.71	30

Average Time = **31.57 s**
Average Velocity = 30/31.57 = **0.9503 m/s**

August 3, 2004

Trial	Time Recorded (s)	Distance (m)
1	36.00	30
2	39.00	30
3	19.00	30

Average Time = **31.33 s**
Average Velocity = 30/31.33 = **0.9575 m/s**

Used Float Float 3

July 26, 2004

Trial	Time Recorded (s)	Distance (m)
1	42.07	30
2	40.92	30
3	19.31	30

Average Time = **34.10 s**
Average Velocity = 30/34.10 = **0.8798 m/s**

***August 3**, 2004*

Trial	Time Recorded (s)	Distance (m)
1	35.00	30
2	51.00	30
3	20.00	30

Average Time = **35.33 s**
Average Velocity = 30/32.33 = **0.8491 m/s**

5.3 Pansipit River

The location of observation site as shown in Figure 4.3 is located at barangay San Nicolas gaging Station, Batangas. The calculations for the velocity measurements using float A and B is tabulated below where:

Average V elocity = Distance x Average time

Other observation data show in **Annex D** *(Observation Results).*

Used float: Float 2

July 26, 2004

Trial	Time Recorded (s)	Distance (m)
1	48.69	30
2	44.86	30

Average Time = **46.775 s**
Average Velocity = 30/46.775 = **0.6414m/s**

August 3, 2004

Trial	Time Recorded (s)	Distance (m)
1	42.54	30
2	47.44	30

Average Time = **44.99 s**
Average Velocity = 30/44.99 = **0.6668 m/s**

Used Float Float 3

July 26, 2004

Trial	Time Recorded (s)	Distance (m)
1	44.46	30
2	43.02	30

Average Time = **43.72 s**
Average Velocity = 30/43.72 = **0.6862 m/s**

***August 3**, 2004*

Trial	Time Recorded (s)	Distance (m)
1	48.33	30
2	47.94	30

Average Time = **48.135 s**
Average Velocity = 30/48.135 = **0.6232 m/s**

5.4 Panaysayan River

The location of observation site as shown in Figure 4.4 is located at barangay Pasong Kawayan II gaging Station, Gen. Trias, Cavite. The calculations for the velocity measurements using plastic bottle calibrated with sand is tabulated below where:

Average V elocity = Distance x Average time

Other observation data show in **Annex D** *(Observation Results).*

Used float: Plastic Bottle calibrated with sand

July 28, 2004

Trial	Time Recorded (s)	Distance (m)
1	71.50	30
2	74.00	30
3	78.00	30

Average Time = **74.50 s**
Average Velocity = 30/74.50 = **0.4027 m/s**

July 30, 2004

Trial	Time Recorded (s)	Distance (m)
1	67.12	30
2	68.08	30
3	69.64	30

Average Time = **68.28 s**
Average Velocity = 30/68.28 = **0.4394 m/s**

5.5 San Cristobal River

The location of observation site as shown in Figure 4.5 is located at barangay San Cristobal gaging Station, Calamba, Laguna. The calculations for the velocity measurements using plastic bottle calibrated with sand is tabulated below where:

Average V elocity = Distance x Average time

Other observation data show in **Annex D** *(Observation Results).*

Used float: Plastic Bottle calibrated with sand

August 4, 2004

Trial	Time Recorded (s)	Distance (m)
1	187.62	30
2	155.93	30
3	160.94	30

Average Time = **168.16 s**
Average Velocity = 30/168.16 = **0.1784 m/s**

August 5, 2004

Trial	Time Recorded (s)	Distance (m)
1	158.36	30
2	164.01	30
3	165.00	30

Average Time = **162.46 s**
Average Velocity = 30/162.46 = **0.1847 m/s**

Annexes

Annex A

Figures

Figure 4.0 Location Map of Target Areas

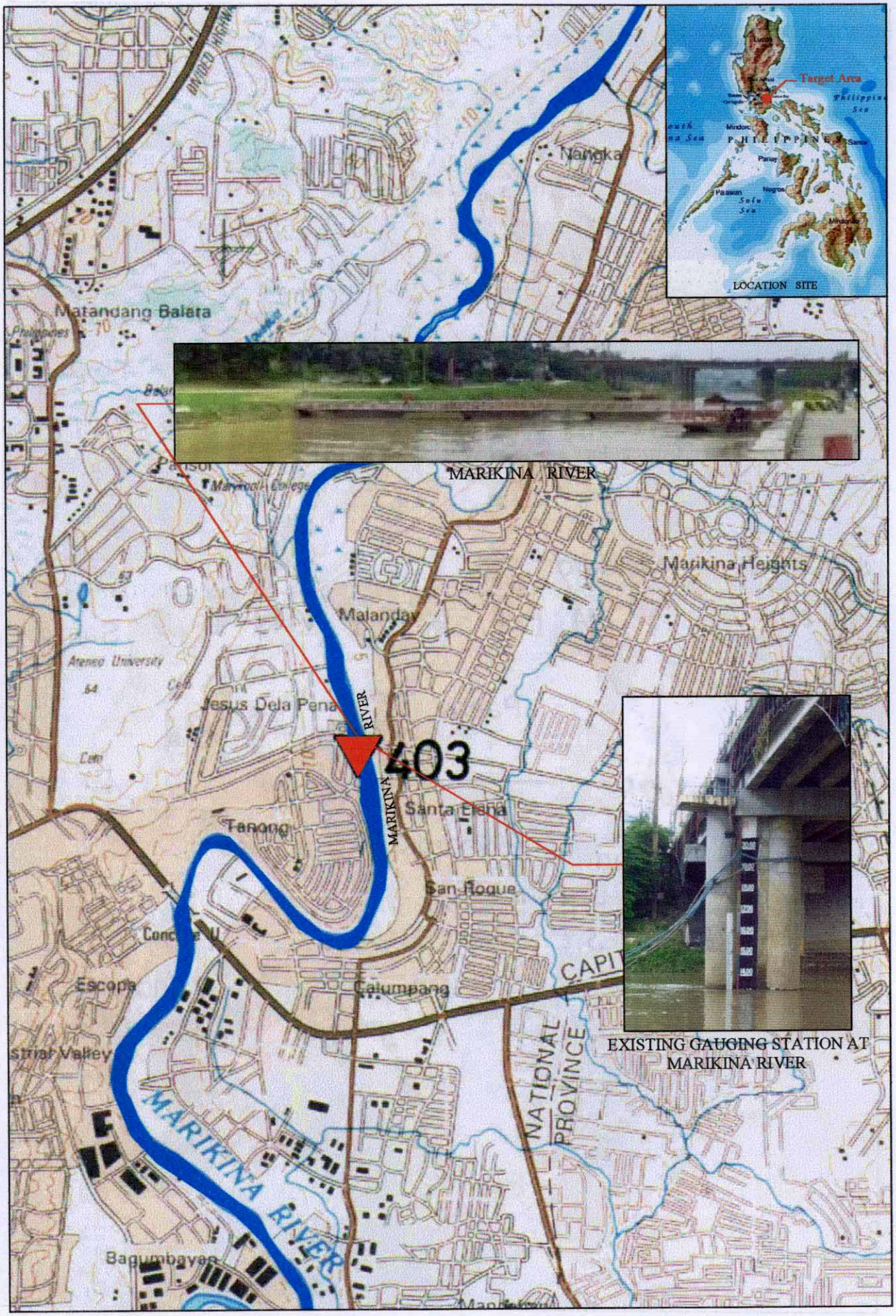


Figure 4-1 Location Map of Marikina River

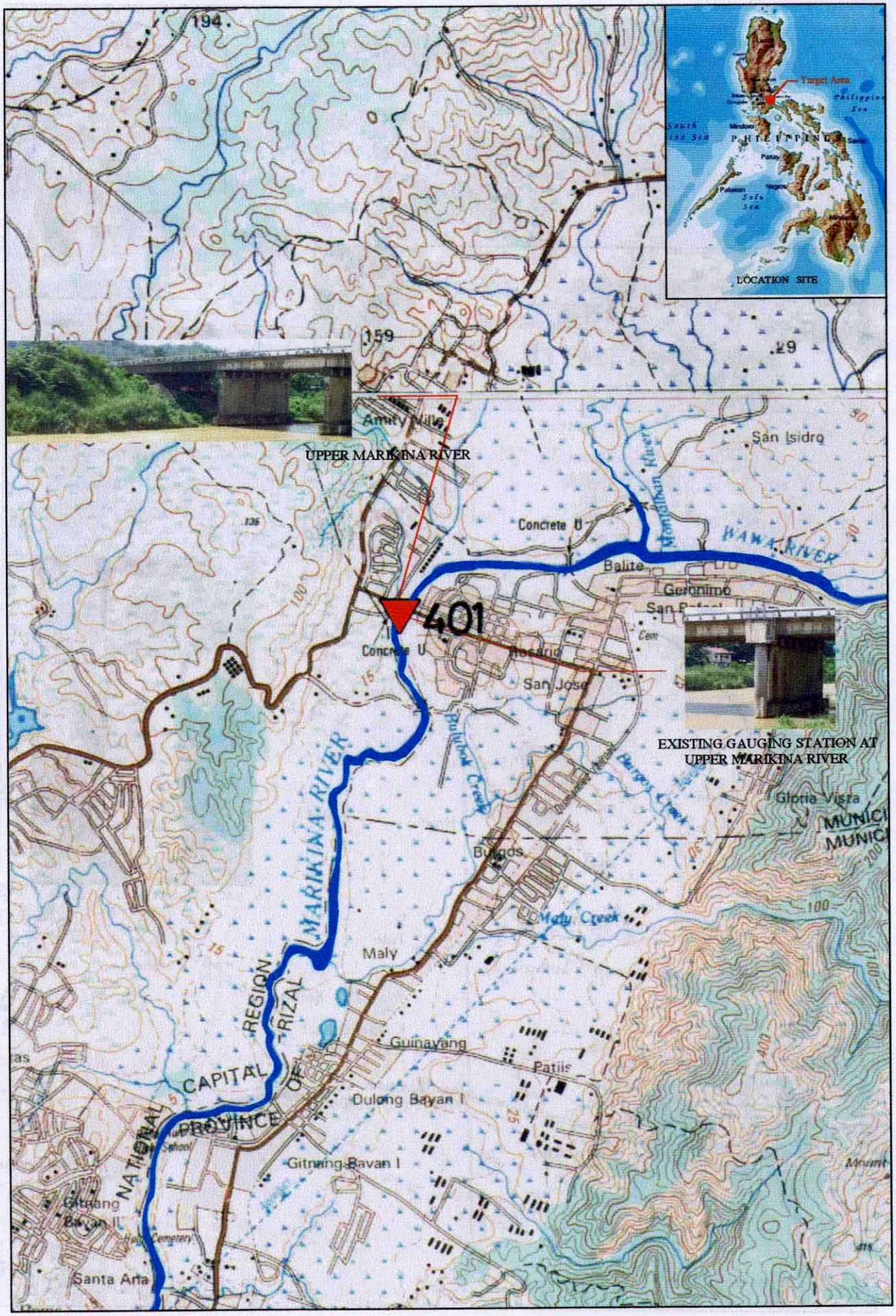


Figure 4-2 Location Map of Upper Marikina River

Figure 4-3 Location Map of Pansipit River

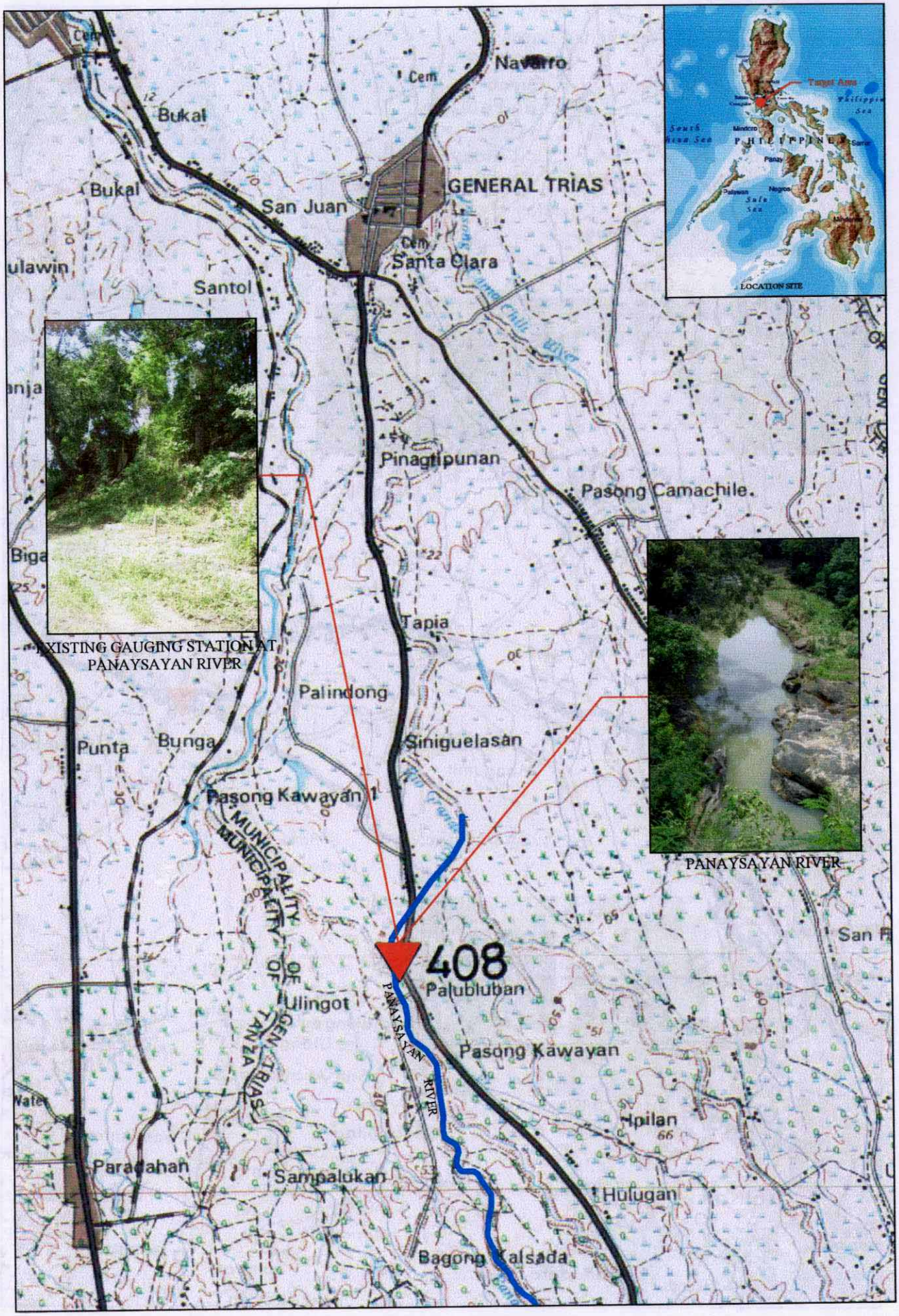


Figure 4-4 Location Map of Panaysayan River

Figure 4-5 Location Map of San Cristobal River

Annex B

Streamflow Measurements Procedures

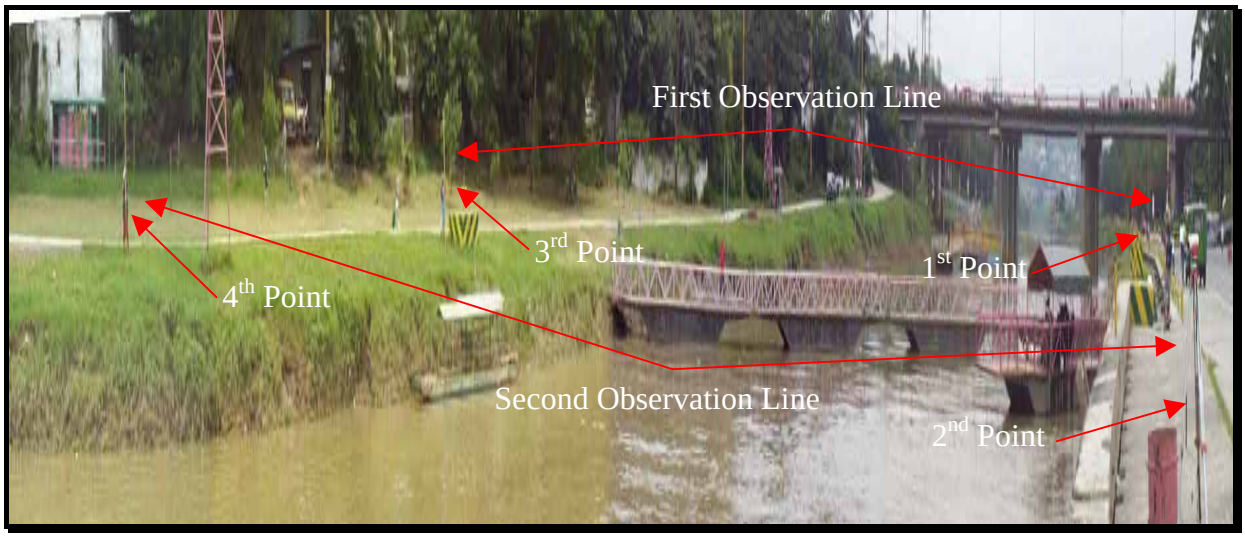
STREAM FLOW MEASURING PROCEDURE

Measuring 30 meter from first observation line up to the second line along the bank of a straight section of the selected river

Setting up the transit that will be used for determining a right angle from the opposite bank and second observation line

Leveling the bubbles of the transit

Determining a 90^{o} from the first observation line
up to the second observation line and opposite bank



Position of four rods that will serve as a reference for starting and end line

Floatman tosses the float into the river above the bridge

Observers waiting the float to cross the first observation line

Observers waiting the float to cross the second observation line

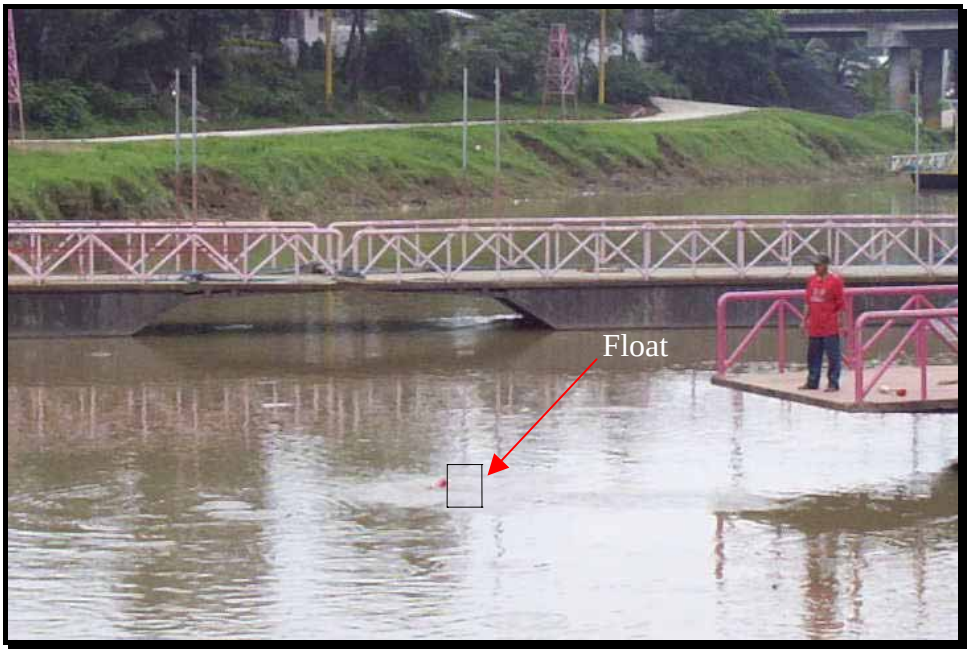
Annex C

Site Photos

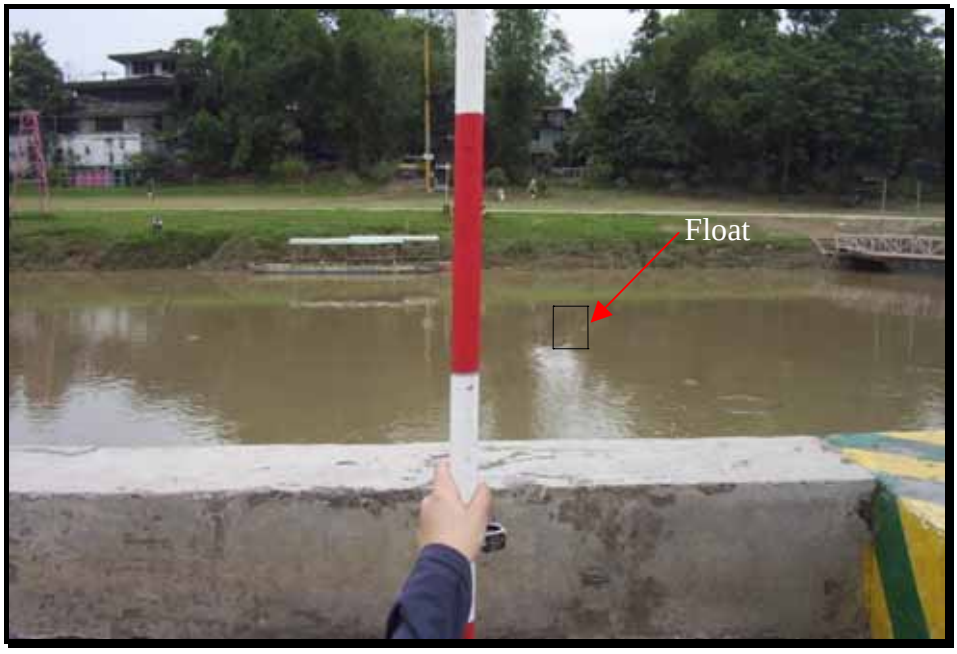
MARIKINA RIVER
(Located at Barangay Sto. Niño, Marikina City)
(July 31 & August 3, 2004)

Location of leveling rod, which will serve as starting and end point of the float

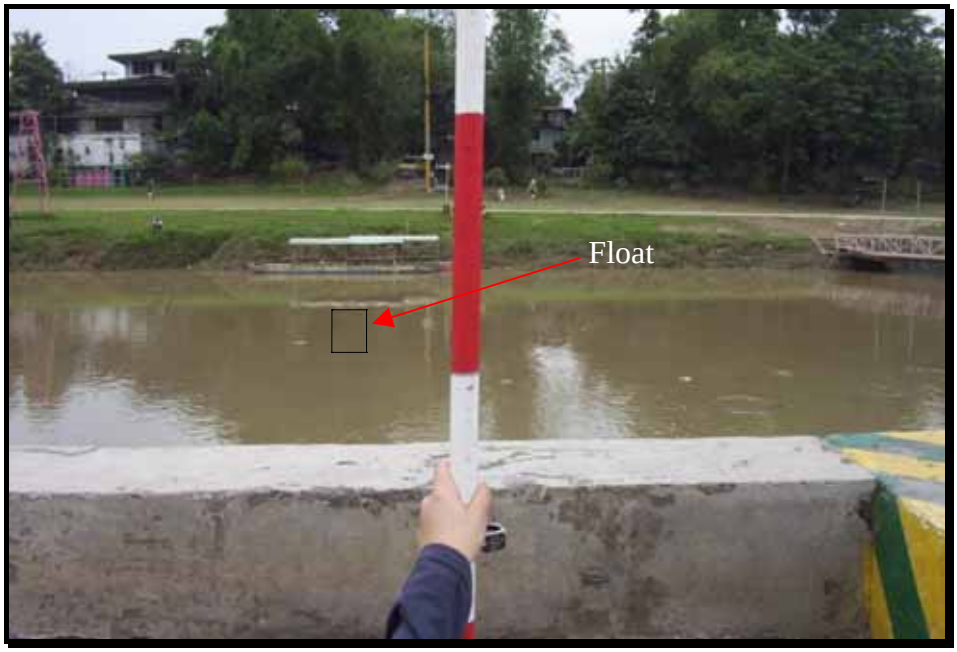
Existing Gauging Station at Sto. Bridge along Marikina River



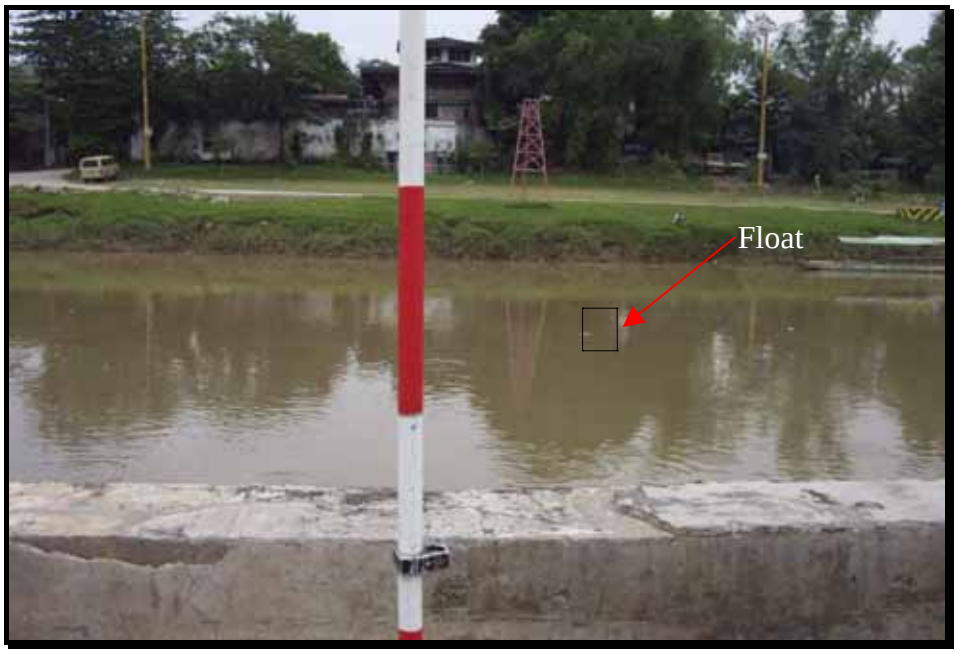
Location of Float after throwing



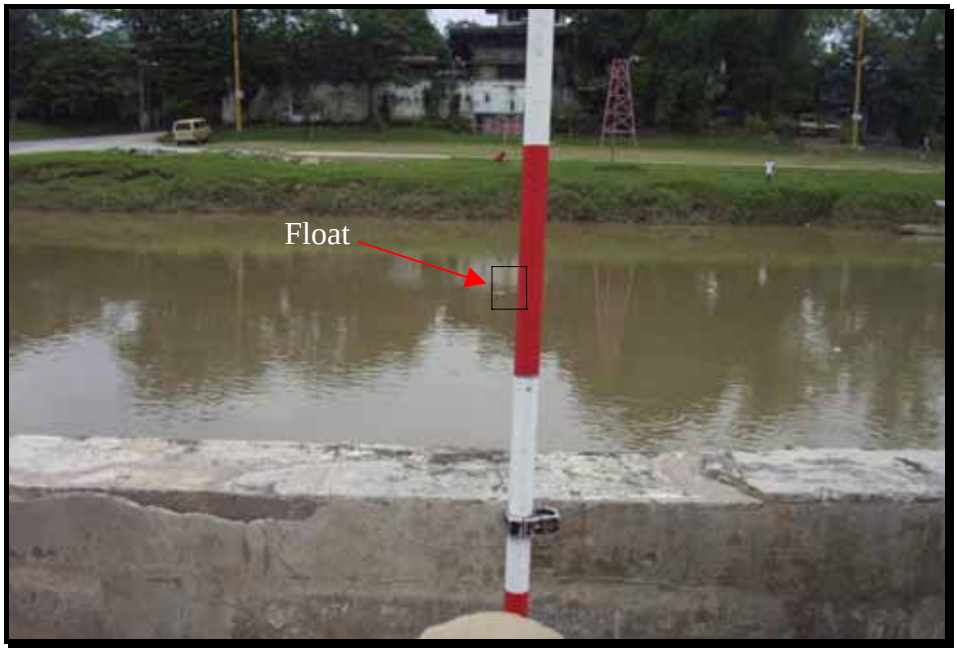
Location of float before entering first point



Location of float after entering the starting point



Location of float before entering end point



Location of float after entering the end point

UPPER MARIKINA RIVER
(Located at Barangay San Jose, Montalban Rizal)
(July 26 & August 3, 2004)

Location of leveling rod, which will serve as starting and end point of the float

Existing Gauging Station at Montalban Bridge, Montalban Rizal

Location of float after throwing

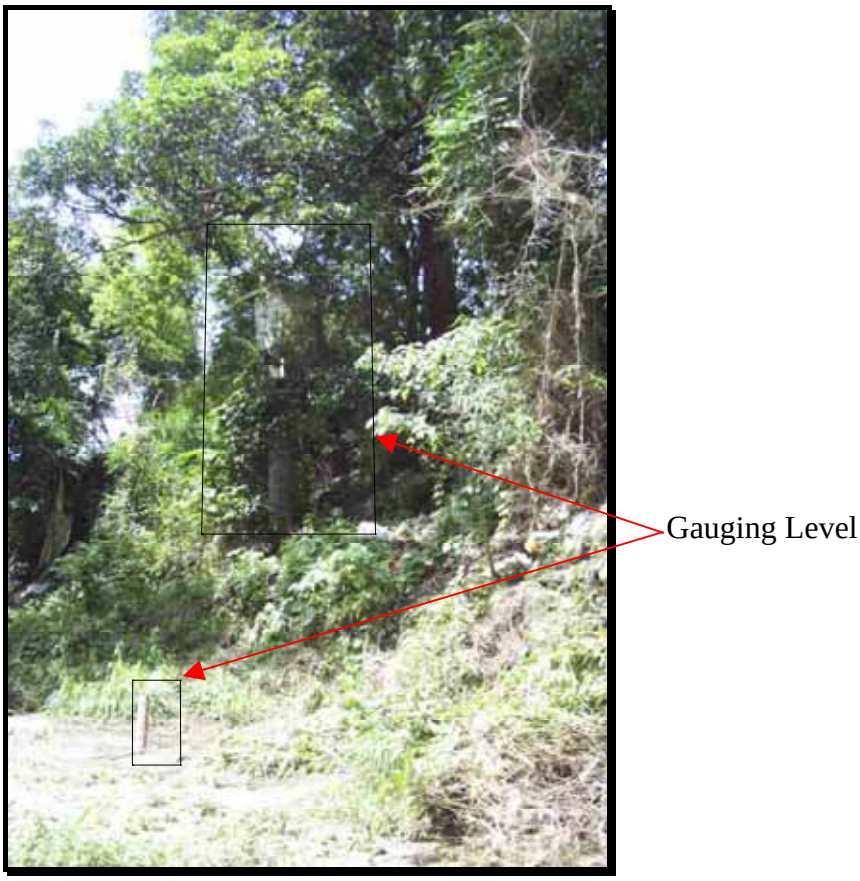
Observing the float to pass within the starting point

Recording the time travel by the float.

PANASAYAN RIVER
(Located at Barangay Pasong Kawayan II, Gen Trias, Cavite City)
(July 28 & 30, 2004)

Location Site at Panaysayan River

Location of leveling rod, which will serve as starting and end point of the float

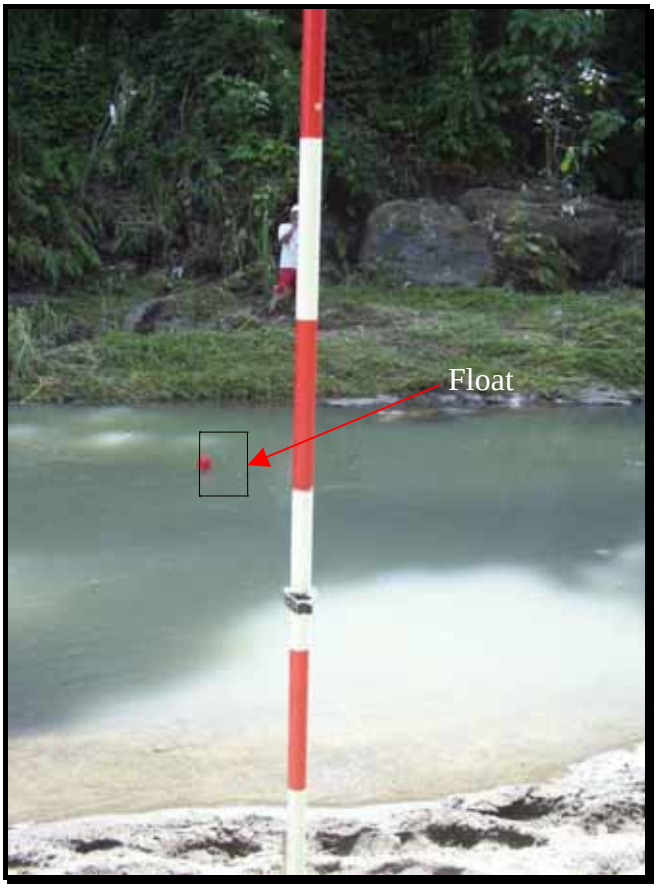


Existing Gauging Station at Panasayan River

Throwing of float

Location of float after throwing

Location of float before entering first point

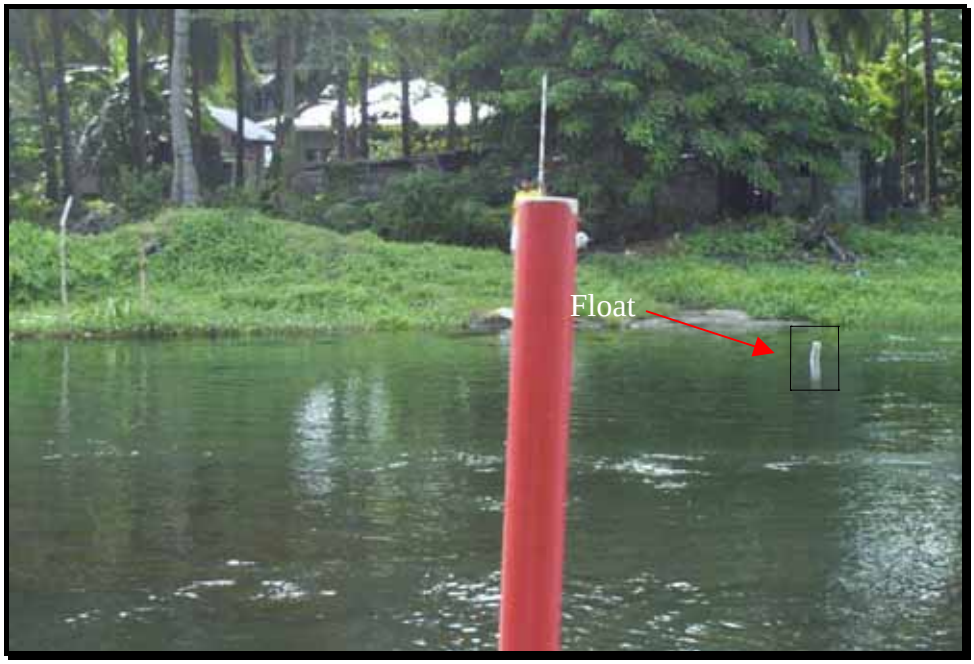


Location of float after entering the end point

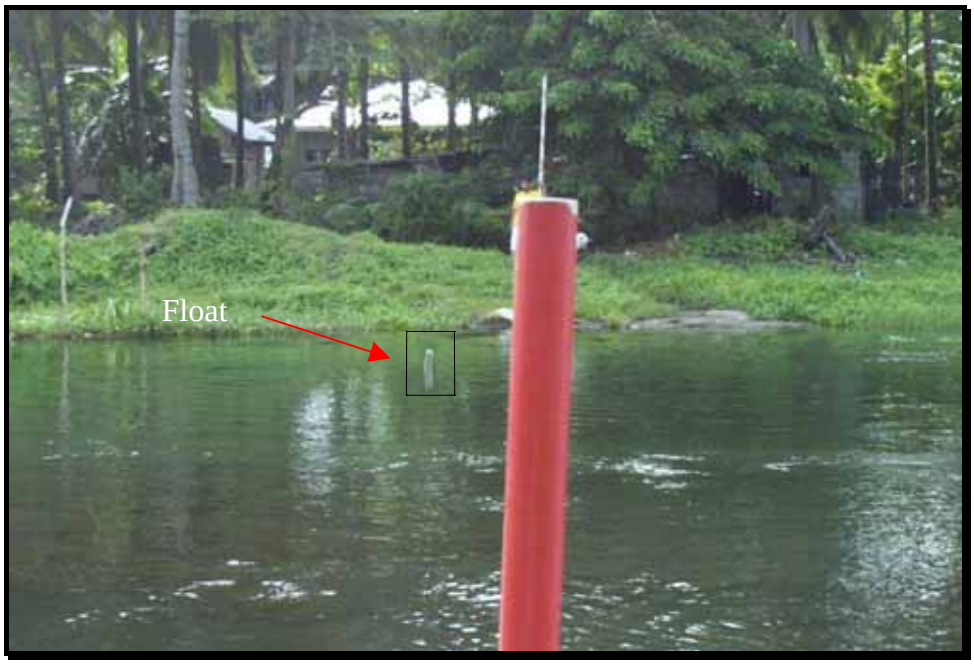
PANSIPIT RIVER
(Located at Barangay Poblacion, San Nicolas, Batangas)
(August 1 & 2, 2004)

Location of leveling rod, which will serve as starting and end point of the float

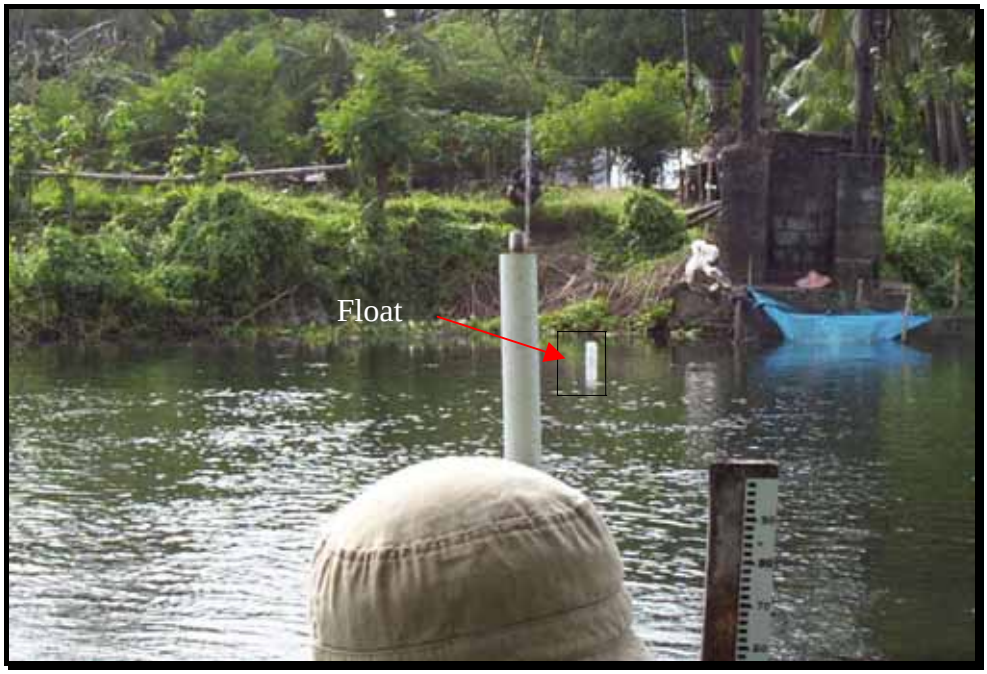
Location of float after throwing



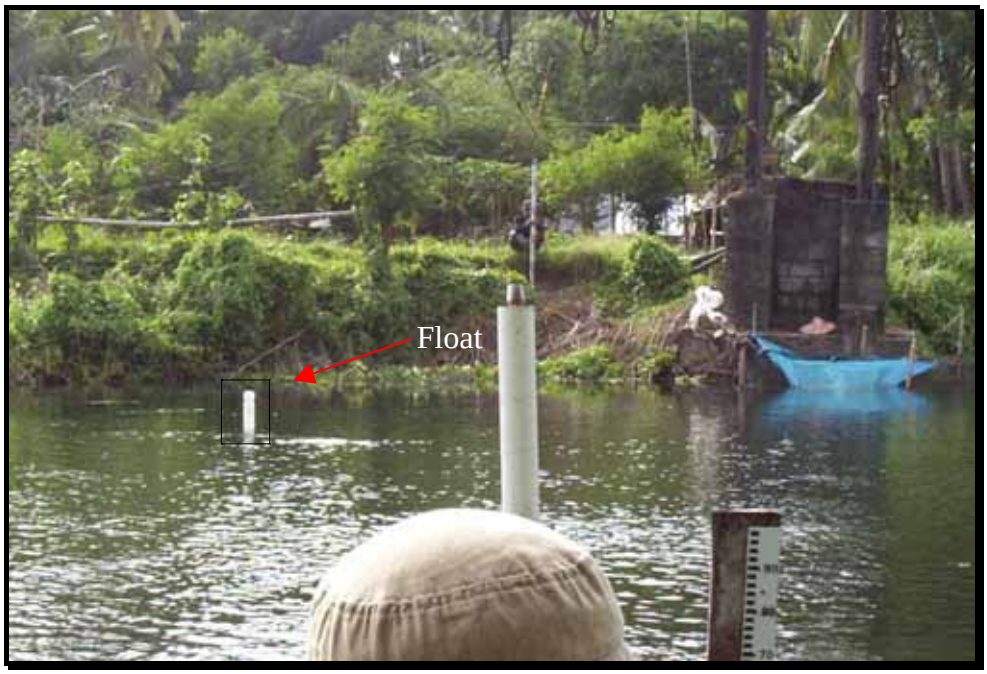
Location of float before entering first point



Location of float after entering the starting point



Location of float before entering end point



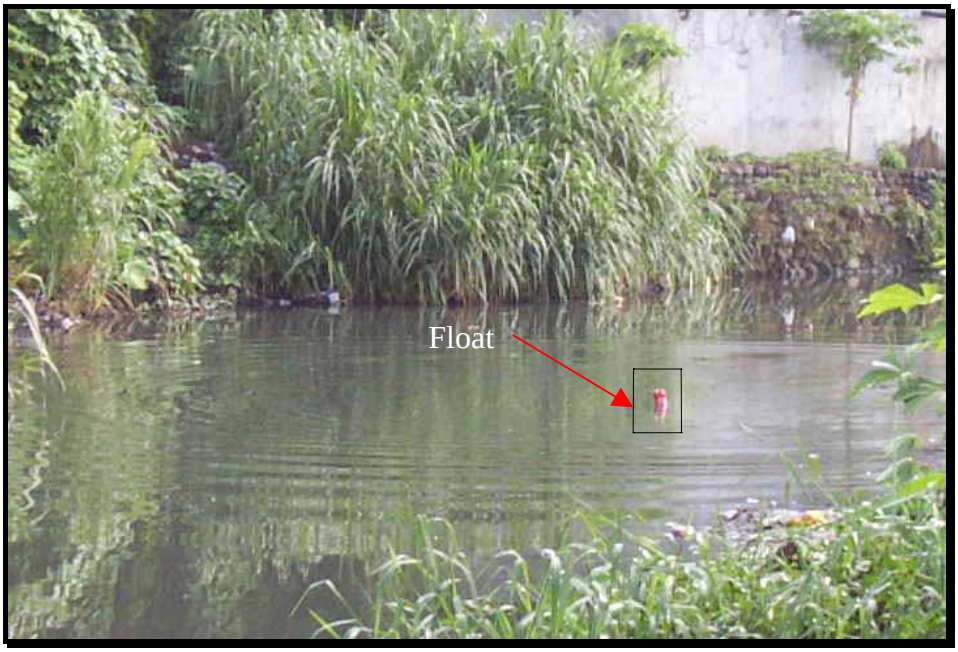
Location of float after entering the end point

Existing Gauging Station at Brgy. Poblacion along Pansipit River

SAN CRISTOBAL RIVER
(Located at Barangay San Cristobal, Calamba Laguna)
(August 4 & 5, 2004)

Location of leveling rod, which will serve as starting and end point of the float

Existing Gauging Station at San Cristobal River



Location of float after throwing

Location of float before entering first point

Location of float after entering the starting point

Location of float before entering end point

Location of float after entering the end point

Annex D

Observation Results

OBSERVATION FORM

RIVER NAME: *Marikina River*

Location: *Sto. Nino, Marikina City*

Water Level: *10.80 meter*

Weather: *Cloudy*

Surrounding Observation: *Presence of Barge*

Date of Measurement: *July 31, 2004*

Time Start: 9:52 AM

FLOAT A

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	9:52 AM	78.75	9:54 AM	30.00	0.3810
2	0.90	9:55 AM	63.19	9:57 AM	30.00	0.4748
3	0.90	9:58 AM	64.36	10:00 AM	30.00	0.4661
4						
5						
6						
7						
					Average Current (m/s) =	0.4363

HyO-45

OBSERVATION FORM

RIVER NAME: *Marikina River*

Location: *Sto. Nino, Marikina City*

Water Level: *12.80 meter*

Weather: *Sunny*

Surrounding Observation: *Presence of Barge*

Date of Measurement: *August 3, 2004*

Time Start: 11:11 AM

FLOAT A

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	11:11 AM	32.00	11:12 AM	30.00	0.9375
2	0.90	11:13 AM	32.00	11:14 AM	30.00	0.9375
3	0.90	11:15 AM	34.00	11:16 AM	30.00	0.8824
4						
5						
6						
7						
					Average Current (m/s) =	0.9184

HyO-46

OBSERVATION FORM

RIVER NAME: *Marikina River*

Location: *Sto. Nino, Marikina City*

Water Level: *10.80 meter*

Weather: *Cloudy*

Surrounding Observation: *Presence of Barge*

Date of Measurement: *July 31, 2004*

Time Start: 9:45 AM

FLOAT B

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	9:45 AM	90.00	9:47 AM	30.00	0.3333
2	0.90	9:48 AM	68.94	9:49 AM	30.00	0.4352
3	0.90	9:50 AM	59.00	9:51 AM	30.00	0.5085
4						
5						
6						
7						
					Average Current (m/s) =	0.4130

OBSERVATION FORM

RIVER NAME: *Marikina River*

Location: *Sto. Nino, Marikina City*

Water Level: *12.80 meter*

Weather: *Sunny*

Surrounding Observation: *Presence of Barge*

Date of Measurement: *August 3, 2004*

Time Start: 11:05 AM

FLOAT B

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	11:05 AM	33.00	11:06 AM	30.00	0.9091
2	0.90	11:06 AM	28.00	11:07 AM	30.00	1.0714
3	0.90	11:08 AM	36.00	11:09 AM	30.00	0.8333
4						
5						
6						
7						
					Average Current (m/s) =	0.9278

HyO-48

OBSERVATION FORM

RIVER NAME: *Montalban River*

Location: *Montalban, Rizal*

Water Level: *21.90 meter*

Weather: *Cloudy*

Surrounding Observation: *Clean*

Date of Measurement: *July 26, 2004*

Time Start: 11:26 AM

FLOAT B

HyO-49

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	11:28 AM	42.07	11:30 AM	30.00	0.7131
2	0.90	11:32 AM	40.92	11:33 AM	30.00	0.7331
3	0.90	11:34 AM	19.31	11:35 AM	30.00	1.5536
4						
5						
6						
7						
					Average Current (m/s) =	0.8798

OBSERVATION FORM

RIVER NAME: *Montalban River*

Location: *Montalban, Rizal*

Water Level: *21.70 meter*

Weather: *Sunny Day*

Surrounding Observation: *Clean*

Date of Measurement: *August 3, 2004*

Time Start: 2:21 PM

FLOAT B

HyO-50

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	2:21 PM	35.00	2:22 PM	30.00	0.8571
2	0.90	2:22 PM	51.00	2:23 PM	30.00	0.5882
3	0.90	2:24 PM	20.00	2:25 PM	30.00	1.5000
4						
5						
6						
7						
					Average Current (m/s) =	0.8491

OBSERVATION FORM

RIVER NAME: *Montalban River*

Location: *Montalban, Rizal*

Water Level: *21.90 meter*

Weather: *Cloudy*

Surrounding Observation: *Clean*

Date of Measurement: *July 26, 2004*

Time Start: 11:35 AM

FLOAT A

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	11:35 AM	39.27	11:36 AM	30.00	0.7639
2	0.90	11:37 AM	33.72	11:38 AM	30.00	0.8897
3	0.90	11:39 AM	21.71	11:39 AM	30.00	1.3819
4						
5						
6						
7						
					Average Current (m/s) =	0.9504

HyO-51

OBSERVATION FORM

RIVER NAME: *Montalban River*

Location: *Montalban, Rizal*

Water Level: *21.70 meter*

Weather: *Sunny*

Surrounding Observation: *Clean*

Date of Measurement: *August 3, 2004*

Time Start: 2:25 PM

FLOAT A

HyO-52

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Time of Last Observation (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	2:25 PM	36.00	2:25 PM	30.00	0.8333
2	0.90	2:25 PM	39.00	2:26 PM	30.00	0.7692
3	0.90	2:26 PM	19.00	2:27 PM	30.00	1.5789
4						
5						
6						
7						
					Average Current (m/s) =	0.9574

OBSERVATION FORM

RIVER NAME: *Panaysayan River*

Location: *Barangay Pasong Kawayan II, General Trias, Cavite*

Water Level: *0.50 m*

Weather: *Sunny*

Surrounding Observation: *Clean*

Date of Measurement: *July 28, 2004*

Time Start: 2:53 PM

BOTTLE

HyO-53

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	2:53 PM	71.50	2:55 PM	30.00	0.4196
2	0.90	2:56 PM	74.00	2:58 PM	30.00	0.4054
3	0.90	2:59 PM	78.00	3:01 PM	30.00	0.3846
4						
5						
6						
7						
					Average Current (m/s) =	0.4027

OBSERVATION FORM

RIVER NAME: *Panaysayan River*

Location: *Barangay Pasong Kawayan II, General Trias, Cavite*

Water Level: *0.50 m*

Weather: *Cloudy with Rainshower*

Surrounding Observation: *Clean*

Date of Measurement: *July 30, 2004*

Time Start: 2:25 PM

BOTTLE

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	2:25 PM	67.12	2:27 PM	30.00	0.4470
2	0.90	2:28 PM	68.08	2:30 PM	30.00	0.4407
3	0.90	2:33 PM	69.64	2:35 PM	30.00	0.4308
4						
5						
6						
7						
					Average Current (m/s) =	0.4394

OBSERVATION FORM

RIVER NAME: *Pansipit River*

Location: *San Nicolas, Batangas*

Water Level: *0.4680 m*

Weather: *Sunny Day*

Surrounding Observation: *Clean*

Date of Measurement: *August 1, 2004*

Time Start: *2:45 PM*

FLOAT B

HyO-55

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	2:45 PM	44.46	2:46 PM	30.00	0.6748
2	0.90	2:47 PM	43.02	2:48 PM	30.00	0.6974
3						
4						
5						
6						
7						
					Average Current (m/s) =	0.6859

OBSERVATION FORM

RIVER NAME: *Pansipit River*

Location: *San Nicolas, Batangas*

Water Level: *0.47 m*

Weather: *Cloudy with Rainshower*

Surrounding Observation: *Clean*

Date of Measurement: *August 2, 2004*

Time Start: 10:03 PM

FLOAT B

HyO-56

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	10:03 AM	48.33	10:04 AM	30.00	0.6207
2	0.90	10:07 AM	47.94	10:08 AM	30.00	0.6258
3						
4						
5						
6						
7						
					Average Current (m/s) =	0.6232

OBSERVATION FORM

RIVER NAME: *Pansipit River*

Location: *San Nicolas, Batangas*

Water Level: *0.4680 m*

Weather: *Sunny*

Surrounding Observation: *Clean*

Date of Measurement: *August 1, 2004*

Time Start: 2:49 AM

FLOAT A

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	2:49 PM	48.69	2:50 PM	30.00	0.6161
2	0.90	2:51 PM	44.86	2:52 PM	30.00	0.6687
3						
4						
5						
6						
7						
					Average Current (m/s) =	0.6414

HyO-57

OBSERVATION FORM

RIVER NAME: *Pansipit River*

Location: *San Nicolas, Batangas*

Water Level: *0.47 m*

Weather: *Cloudy with Rainshower*

Surrounding Observation: *Clean*

Date of Measurement: *August 2, 2004*

Time Start: *10:05 PM*

FLOAT A

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	10:05 PM	42.54	10:06 PM	30.00	0.7052
2	0.90	10:09 PM	47.44	10:10 PM	30.00	0.6324
3						
4						
5						
6						
7						
					Average Current (m/s) =	0.6668

HyO-58

OBSERVATION FORM

RIVER NAME: *San Cristobal River*

Location: *Barangay San Cristobal, Calamba, Laguna*

Water Level: *0.52 m*

Weather: *Cloudy with Rain*

Surrounding Observation: *Presence of Garbage*

Date of Measurement: *August 4, 2004*

Time Start: 3:50 PM

BOTTLE

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	3:50 PM	187.62	3:54 PM	30.00	0.1599
2	0.90	3:54 PM	155.93	3:57 PM	30.00	0.1924
3	0.90	3:57 PM	160.94	4:00 PM	30.00	0.1864
4						
5						
6						
7						
					Average Current (m/s) =	0.1784

HyO-59

OBSERVATION FORM

RIVER NAME: *San Cristobal River*

Location: *Barangay San Cristobal, Calamba, Laguna*

Water Level: *0.52 m*

Weather: *Cloudy*

Surrounding Observation: *Presence of Garbage*

Date of Measurement: *August 5, 2004*

Time Start: 11:20 AM

BOTTLE

CURRENT MEASUREMENT USING FLOAT						
Float	Weight (kg)	Time of Lowering	Total Time Travelled (sec)	Time End	Total Distance Travelled (m)	Float Current (m/s)
1	0.90	11:20 AM	158.36	11:23 AM	30.00	0.1894
2	0.90	11:23 AM	164.01	11:26 AM	30.00	0.1829
3	0.90	11:26 AM	165.00	11:30 AM	30.00	0.1818
4						
5						
6						
7						
					Average Current (m/s) =	0.1847

HyO-60