

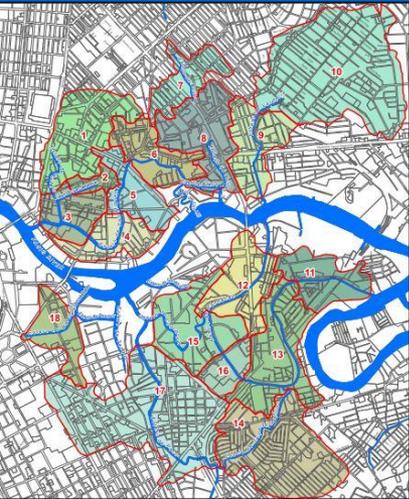
THE COMMUNICATION STORY OF ESTERO DE PACO

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INTERVENTIONS

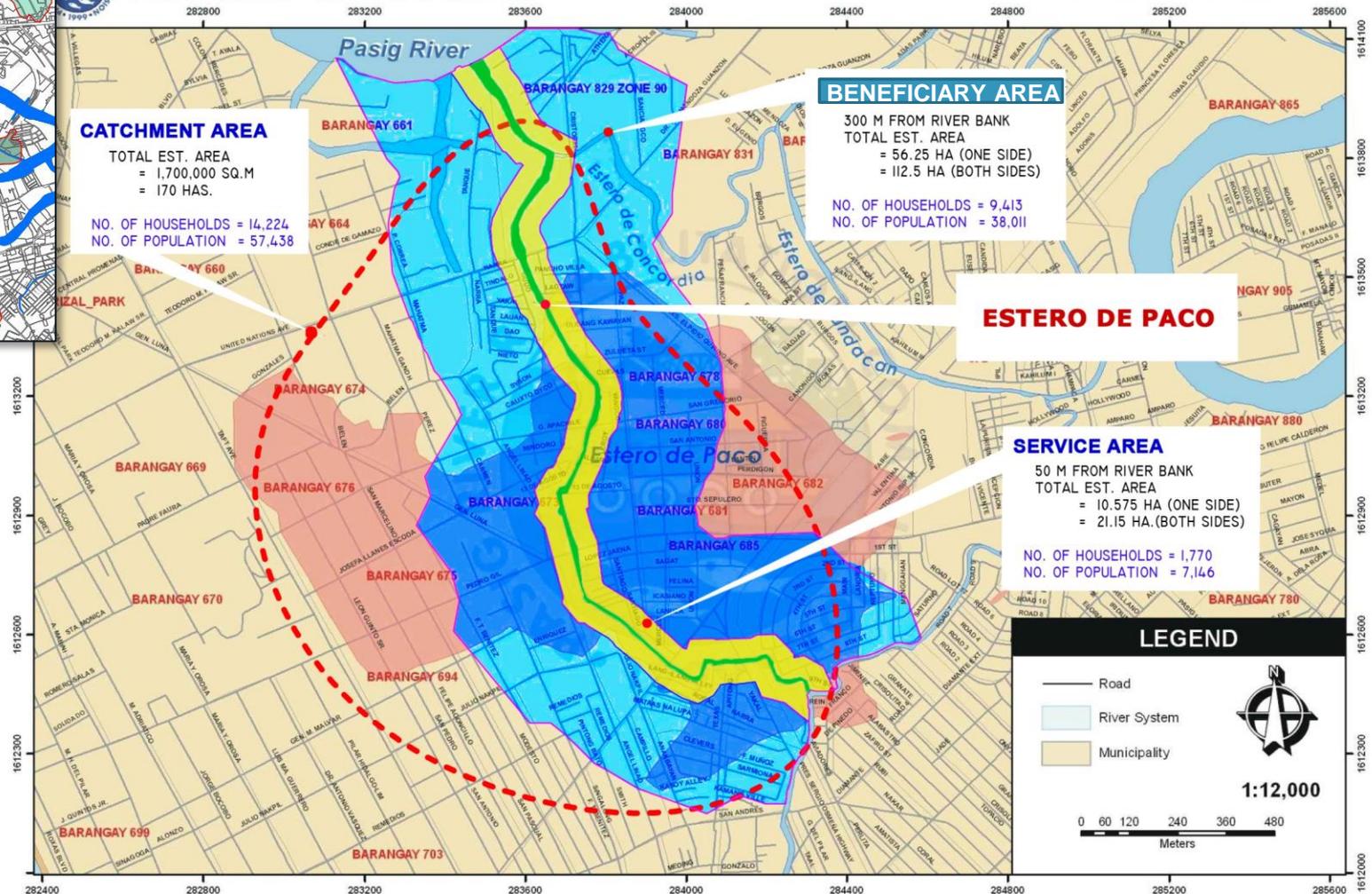
- 1. Wastewater treatment pilot**
2. Flood gates management guidelines (MMDA)
3. Interceptors and combined sewer management (Maynilad)
4. Headwaters interception (MWSS and Manila Water)
- 5. Solid waste management improvement (LGU)**
- 6. Paco Market water and waste management (concession)**
- 7. Stakeholder awareness, capacity building, institutional arrangements**

ESTERO DE PACO



ESTERO DE PACO

VICINITY MAP



ORIGINAL SITUATION

Before clean up



After clean up



- Estero water does not meet **quality standards**
- **Need to intercept pollutants** (infrastructure+ behavior)

COMMUNICATION CHALLENGES & ADB'S APPROACH

- **Intercept pollutants before they get to the river:**
 - Treat water on site or connect to network
 - Sort waste / recycle and collect remaining
 - Practice good market management
 - Flood gates management
- **Address residents' resistance in paying for garbage collection and waste water connection**

COMMUNICATION CHALLENGES & ADB'S APPROACH

Local Community Helps Keep Manila River Clean

Video | 16 December 2014



<https://www.youtube.com/watch?v=e5Okm7VBJE8>

<https://www.adb.org/news/videos/local-community-helps-keep-manila-river-clean>

Estero de Paco was the first tributary of Manila's Pasig River to be rehabilitated. The local community is now maintaining the creek and its surroundings clean with the help of a wastewater treatment facility built under an ADB-supported project.

TREATMENT WATER ON SITE

- **SITUATION:** HH and septic tanks direct discharge into the Estero
- **CHALLENGES:**
 - **Capture and treat** sewage and grey water before flowing into the Estero
 - Change people's behavior
 - Allow Estero water to flow into the Pasig River, through flood gates operation
 - Improve the CSOs. (Alert)
 - **Pilot easily replicable** example.
 - **USD 60,000** and minimum O&M expenses

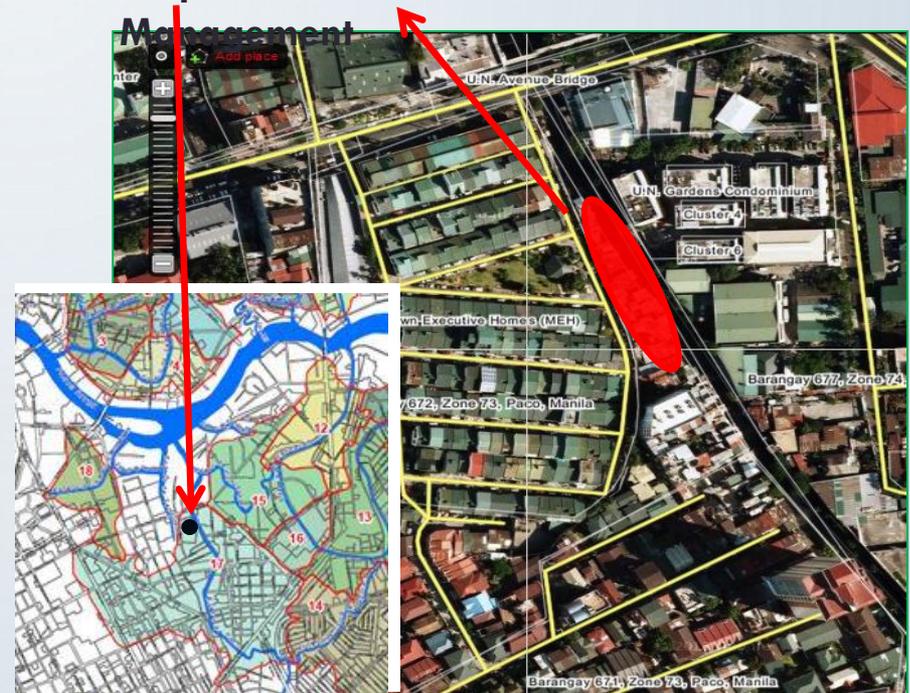


SELECTED SITE: BARANGAY 672

Objectives:

- show intercepting and treating discharges with a low cost system can provide good effluent
- prove its efficiency, and feasibility for larger scale replication

Proposed Site for the Wastewater



- 58 houses, 7 existing septic tanks
- Direct discharge to estero
- Population: ~496 people
- Est. water consumption ~30m³/d
- Average BOD est.: 127 mg/l

1. WASTEWATER TREATMENT PILOT

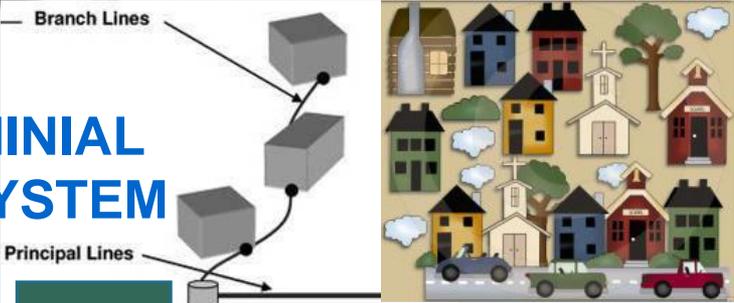
Infrastructure

- **Condominial Sewerage System**
- **Solar-powered pumps**
- **Anaerobic Baffled Reactor (ABR)**
- **Constructed Wetland (CW)**
- **Combined sewer overflow (CSO)**
construction and connection to sewer line

- **Complemented with**
 - **Training** (masonry, construction of CSS)
 - **O&M Workshop**
 - ✓ community association
 - ✓ barangay officials
 - ✓ River Warriors

PILOT PROJECT PROCESS

CONDOMINIAL SEWER SYSTEM



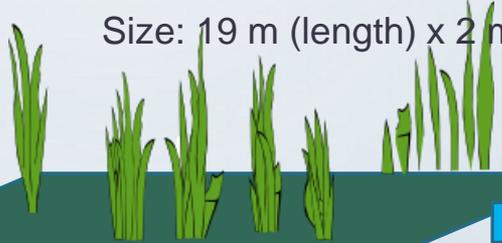
BOD: 127 mg/l
Flow: 30 m³/d

Grey and Black
Water

BOD: 127 mg/l
Flow: 30 m³/d

CONSTRUCTED WETLAND

Marsh plant: 3 -4 plants/m²
75% BOD removal
Size: 19 m (length) x 2 m (width)



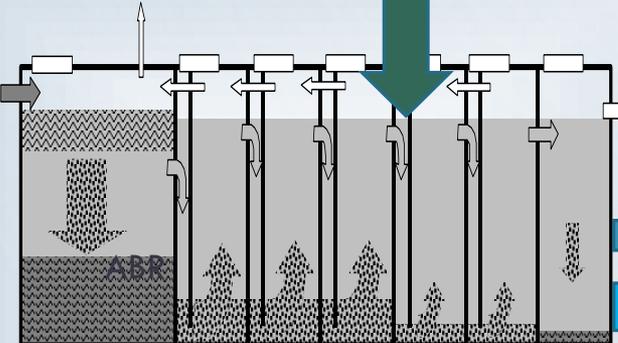
BOD: 38 mg/l
Flow: 6 m³/d

BOD: 9 mg/l
Flow: 6 m³/d

ESTERO
DE PACO

ANAEROBIC BAFFLED REACTOR (ABR)

Hydraulic retention time: 1.5 days
70% BOD removal
Size: 9 m (length) x 2 m (width) x 2.5 m (depth)



BOD: 38 mg/l
Flow: 24 m³/d



PILOT PROJECT LOCATION



CONSTRUCTION



Collector box

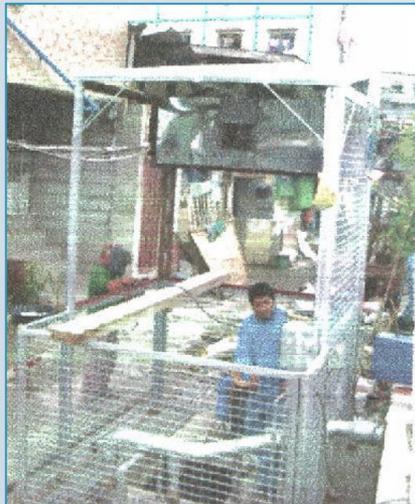


ABR

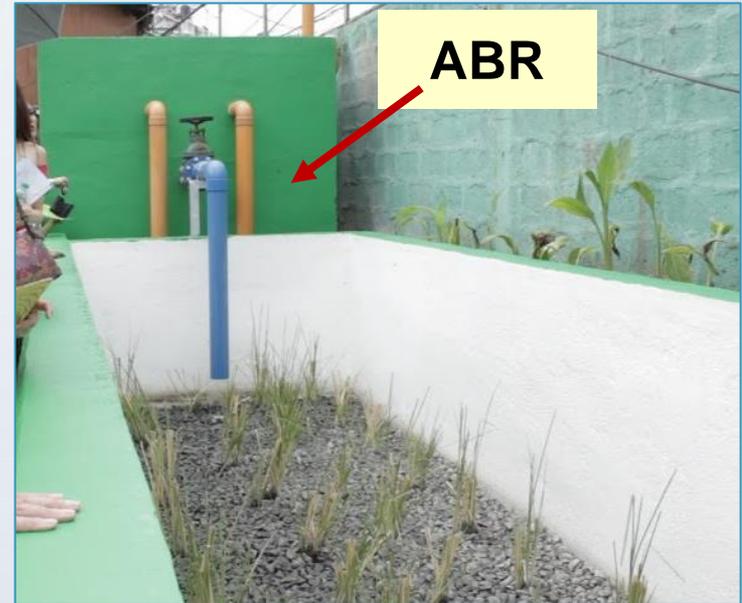


**constructed wetland:
gravel layer and outfall**

PILOT PROJECT



sump pit, 2 pumps, solar panel



constructed wetland

MOU SIGNING

MOU between PRRC and Barangay 672

- Turnover of pilot project to Barangay 672 and Kilusang Pang-kapitbahay at Pang-kabuhayan, Inc.
- **Financing mechanism** for O&M sustainability
- **Roles and responsibilities:** Barangay, City Government, PRRC, national government agencies, Maynilad



2. FLOOD GATE MANAGEMENT

- Objective: avoid water stagnancy

Flood gate operator:

Metro Manila Development Authority (MMDA)

Recommendation

- Flood gates should be opened if water level in Estero de Paco is higher than in Pasig River.



4. SEWER AND DRAINAGE LINES MANAGEMENT

Operators: Maynilad / MMDA

Recommendations:

sewer wastewater from toilets, bathrooms and kitchens

drainage Rainwater (no toilet connection)



clogging Avoid clogging in sewers and drains to prevent overflows



frequency In the same place:
Find cause, come up with a suitable solution.

5. HEADWATERS

- **Septic tank** blocking flow between Estero de Paco and Estero Tripa de Gallina
 - Septic tank removed
 - Manila Water connect the outfall to its sewer system.
 - MWSS endorsed the plan.



6. SOLID WASTE MANAGEMENT

INITIAL ACTION PLAN

SITUATION: Solid waste dumped directly or washed out into Estero

CHALLENGE: Sort and recycle waste | For unrecyclable waste, bring to suitable collection point

Operator: Manila LGU

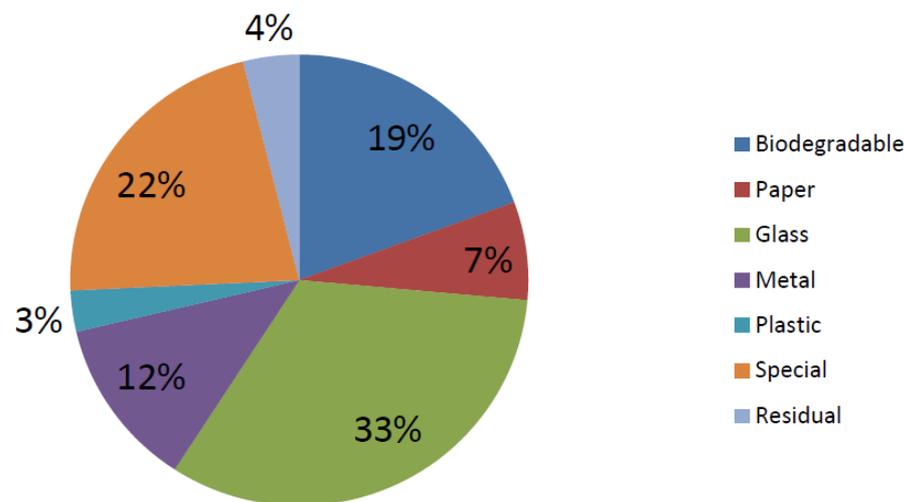
• **Solid waste management issues:**

- Large quantities involved
- Small alleys no truck accessible
- Inefficient collection.

• **Segregation to get revenues from 'valuables':**

- Organic matter, plastics, paper, glass and metal.

Bulk Density



6. SOLID WASTE MANAGEMENT PILOT

Improved collection system

- Containers for disposal, collection and Recycling Points
- Collection schedule
- Transfer/Storage points established for selected alleys
- Routes for LGU's garbage trucks reviewed and discussed



6. SOLID WASTE MANAGEMENT PILOT



Composting

- Paco Market organic waste collection and vermi-composting at **Lukban Elementary School**
- Compost taken by City Parks

MRF

- new MRF in Paco Market
- Segregation Bins

7. PACO MARKET

Strategies for Wastewater and Solid Waste Management Improvement

SITUATION: Waste and sewage directly dumped

CHALLENGE: Good management of market

- **Operator:** Paco Market Admin
- **Issues:**
 - Septic tank from fish section, overflows to estero
 - Other discharges directed to drainage.
 - Solid waste is not properly collected



REMOVAL OF ISLAND AERATORS AND DREDGING OF ESTERO



• Issues

- Did not improve water quality
- Costly operation
- Created sludge
 - Need to dredge the estero
- Obstruction of water flow
 - Remove aerators to avoid floods

CAPACITY DEVELOPMENT

- Training at Escuela Taller Intramuros
- Waste Analysis and Characterization
- O&M Training for the pilot project
- Workshops
 - Barangay Convention
 - Wastewater and Waterways Management Workshop



STAKEHOLDER AWARENESS

Mural painting



STAKEHOLDER AWARENESS

Play: “The Monster in the Water”

Paco Market (26 April 2014)



INSTITUTIONAL ARRANGEMENTS

GENERAL GOALS: IMPROVEMENT IN WATER QUALITY, PHYSICAL ENVIRONMENT, URBAN QUALITY OF LIFE, LOCAL ECONOMY, COMMUNITY INVOLVEMENT

1

ASSESSMENT
PLANNING
& COORDINATION
PRRC, KBPIP

2

RESETTLEMENT
OF ISFs
NHA, KBPIP, LIAC
MMDA, CEO, AFP

3

CLEARING OF
EASEMENT
MMDA

4

CLEARING &
CLEANING OF
WATERWAY
MMDA, KBPIP,
PRRC, CEO, DPS,
AFP

5

INFRASTRUCTURE
& LANDSCAPING
PRRC, DPWH,
LGU, Barangay

6

COMMUNITY
ORGANIZATION
& TRAINING
KBPIP, PPRC,
River Warriors, AFP, PNP
Adamson

7

COMMUNITY
INFORMATION &
EDUCATION
KBPIP, PPRC, River
Warriors, Barangay,
Block & Cluster
Leaders, Maynilad

8

SOLID WASTE
MANAGEMENT
LGU, River Warriors,
NSWMC

10

MAINTENANCE OF
PEACE & ORDER
AFP, River Warriors

12

REGULAR CLEAN UP &
WATER QUALITY
MONITORING
PRRC, KBPIP,
River Warriors,
PEEP, City Engg,
Residents

14

PUBLIC
ADVOCACY,
MARKETING
PRRC, KBPIP

9

WASTEWATER
MANAGEMENT
Maynilad, Manila
Water, Sanitary
Inspector

11

URBAN
REDEVELOPMENT
KBPIP, DPWH,
PAGCOR (Paco
Market)
Homeowners

13

INFRASTRUCTURE
MAINTENANCE
PRRC, River
Warriors, Maynilad



**AWARENESS
START AT EARLY
AGES AND
SUSTAINED
OVERTIME**