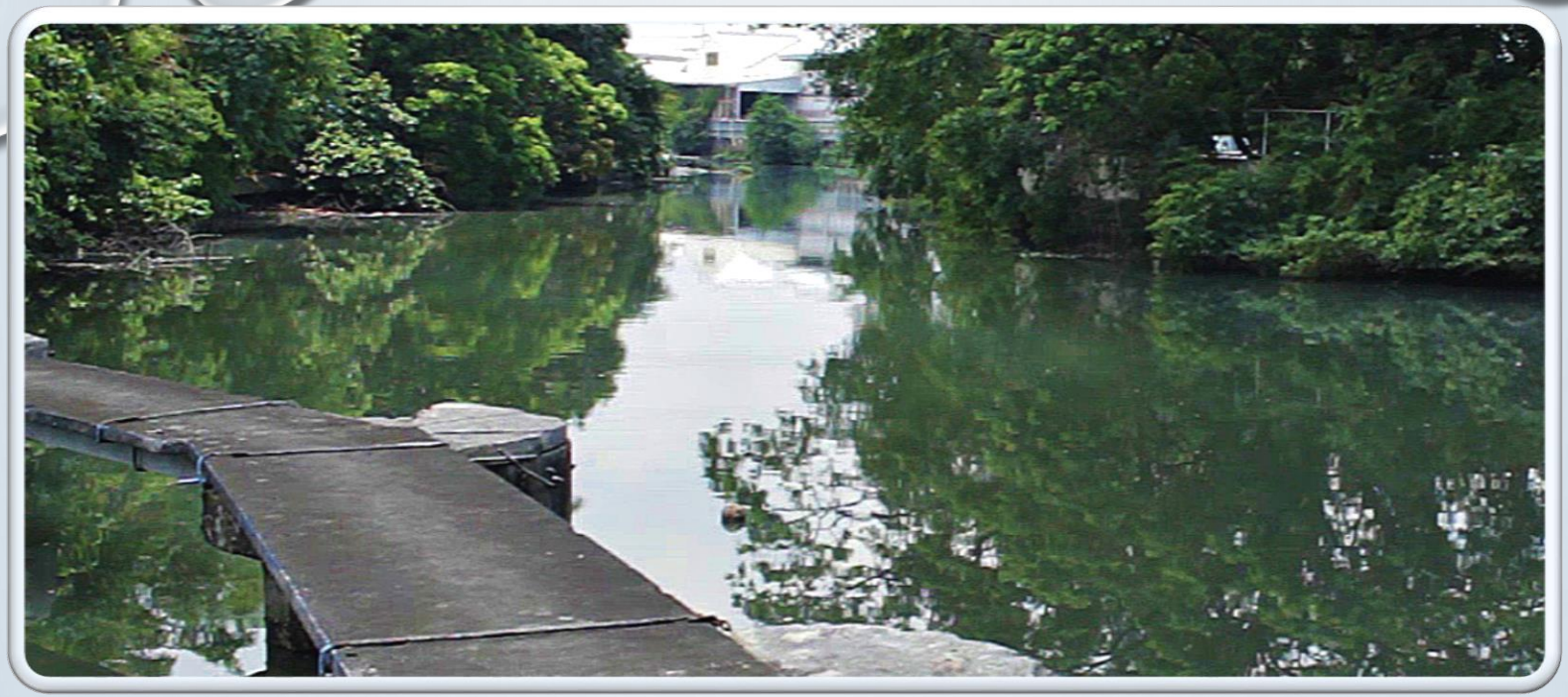
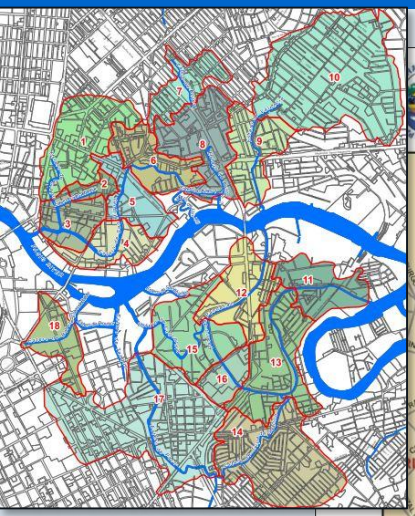


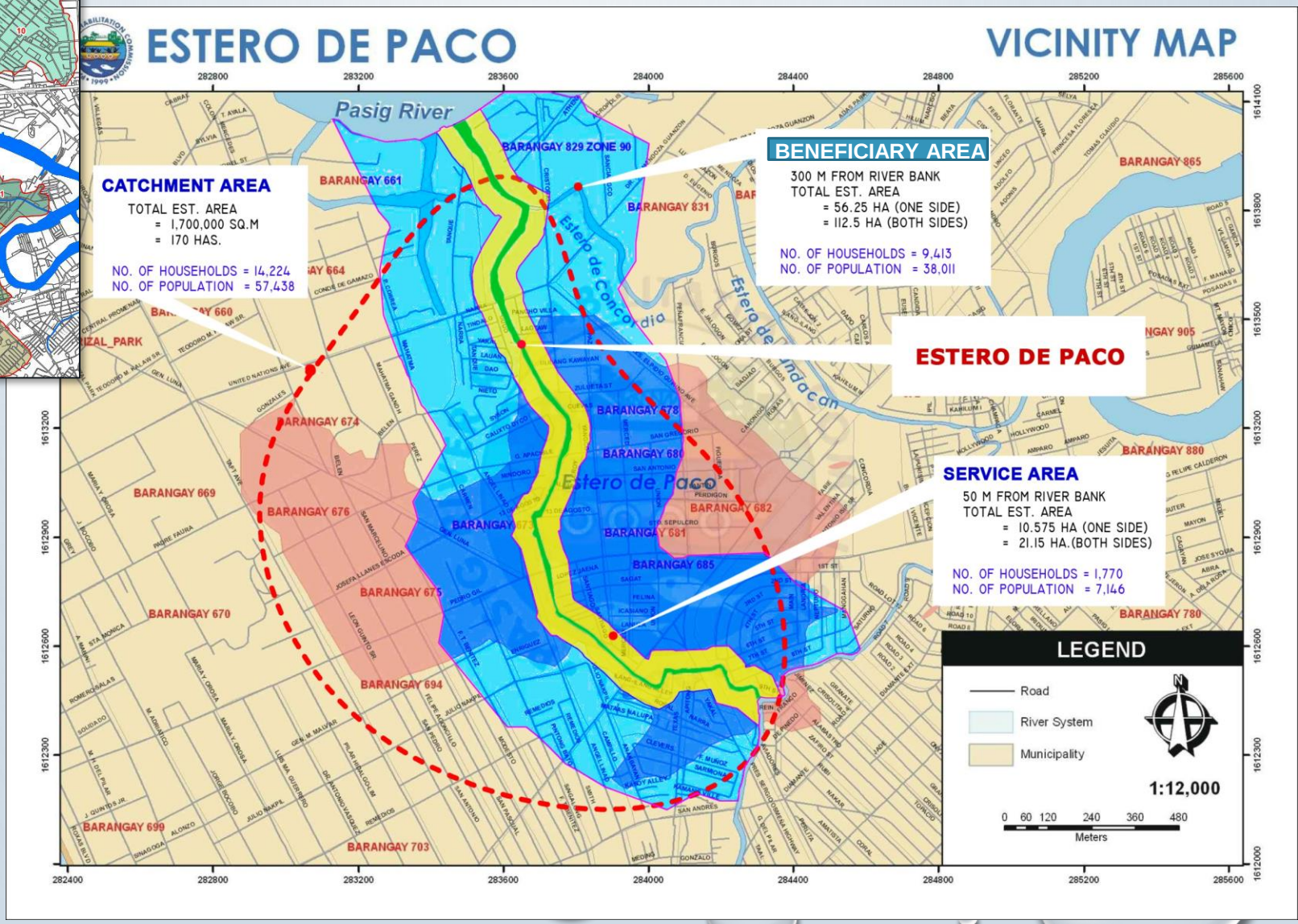
ESTERO DE PACO CONDOMINIAL WASTEWATER SYSTEM

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





ORIGINAL SITUATION

Before clean up

After clean up

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

ADB

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**

ADB

CHALLENGES & ADB'S APPROACH

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

OR

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

ON SITE WASTEWATER TREATMENT

- **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

ADB

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

- 58 houses, 7 existing septic tanks
- Direct discharge to estero
- Population: ~496 people
- Est. water consumption ~30m^3/d
- Average BOD est.: 127 mg/l

1. WASTEWATER TREATMENT PILOT

Infrastructure

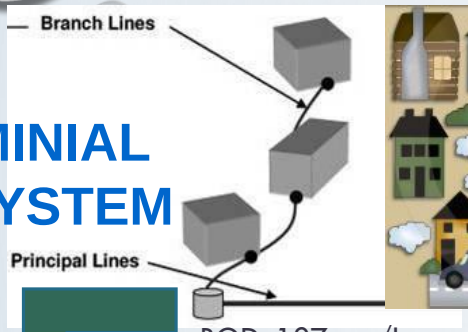
- **Condominial Sewerage System**
- **Solar-powered pumps**
- **Anaerobic Baffled Reactor (ABR)**
- **Constructed Wetland (CW)**
- **Combined sewer overflow (CSO)**
  construction and connection to sewer line

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

ADB

PILOT PROJECT PROCESS

CONDOMINIAL SEWER SYSTEM



BOD: 127 mg/l
Flow: 30 m^3/d

BOD: 127 mg/l
Flow: 30 m^3/d

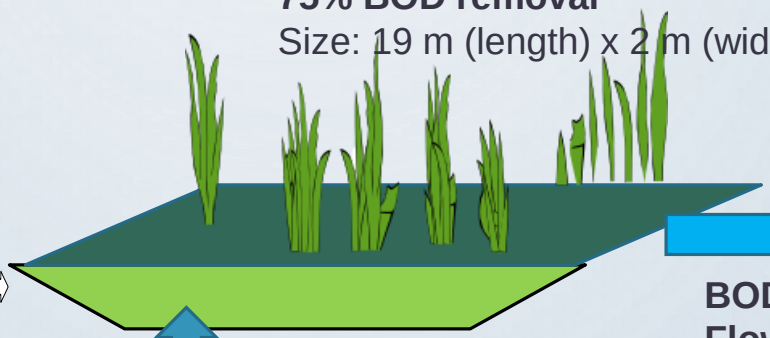
Grey and Black Water

CONSTRUCTED WETLAND

Marsh plant: 3 -4 plants/m^2

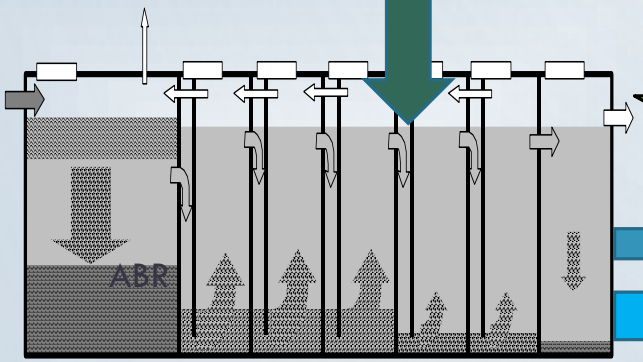
75% BOD removal

Size: 19 m (length) x 2 m (width)



BOD: 9 mg/l
Flow: 6 m^3/d

BOD: 38 mg/l
Flow: 6 m^3/d



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 m^3/d

ESTERO DE PACO

ADB

PILOT PROJECT LOCATION

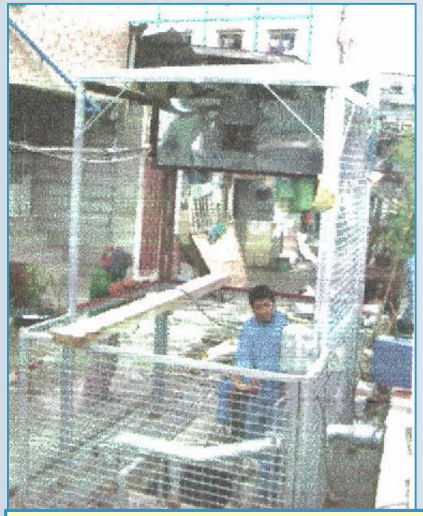
CONSTRUCTION

Collector box

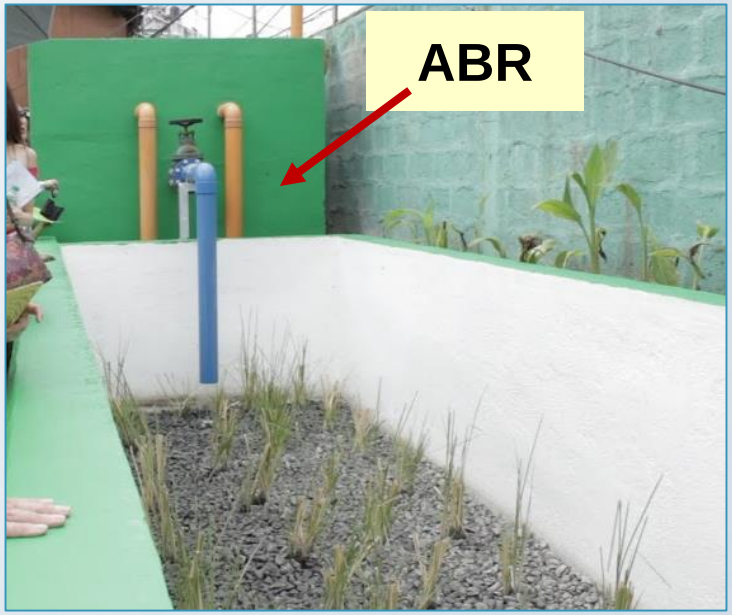
ABR

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

ADB

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.

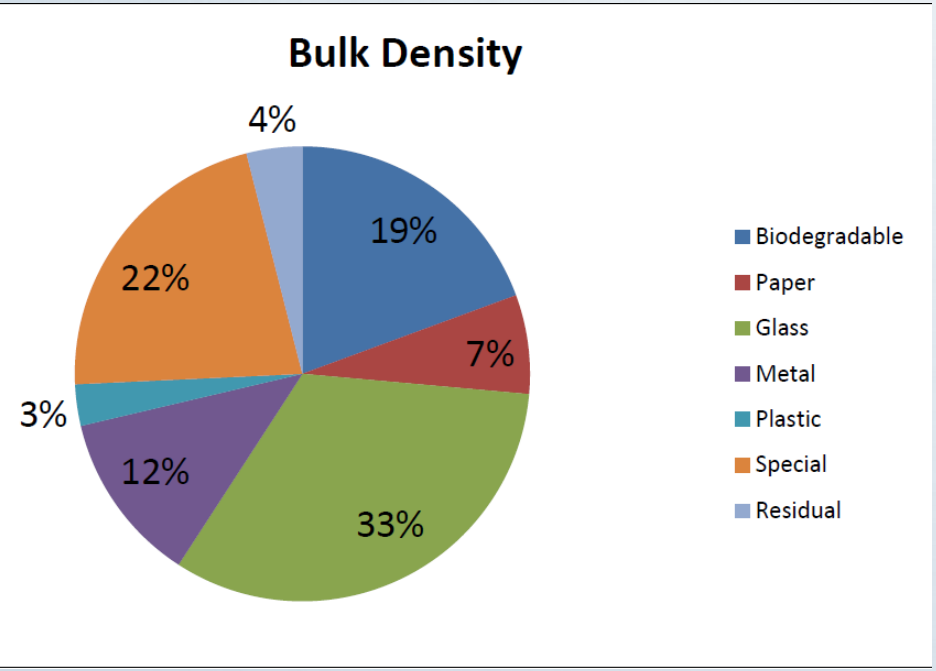
5. HEADWATERS

- **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.

ADB

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

ADB

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

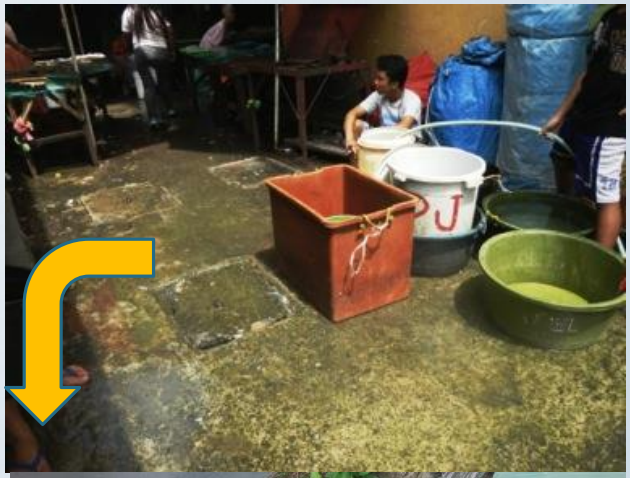
7. PACO MARKET

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

ADB

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)

https://www.youtube.com/watch?v=xGQLzw2P_FU

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, PRRC, River Warriors, Barangay, Block & Cluster Leaders, Maynilad
8. SOLID WASTE MANAGEMENT
   LGU, River Warriors, NSWMC
9. WASTEWATER MANAGEMENT
   Maynilad, Manila Water, Sanitary Inspector
10. MAINTENANCE OF PEACE & ORDER
    AFP, River Warriors
11. URBAN REDEVELOPMENT
    KBPIP, DPWH, PAGCOR (Paco Market) Homeowners
12. REGULAR CLEAN UP & WATER QUALITY MONITORING
    PRRC, KBPIP, River Warriors, PEEP, City Engg, Residents
13. INFRASTRUCTURE MAINTENANCE
    PRRC, River Warriors, Maynilad
14. PUBLIC ADVOCACY, MARKETING
    PPRC, KBPIP

ADB

UN HABITAT
FOR A BETTER URBAN FUTURE

AWARENESS START AT EARLY AGES AND SUSTAINED OVERTIME