Republic of the Philippines

Thematic Workshop on Water-Related Disaster and Its Management in Asian Countries

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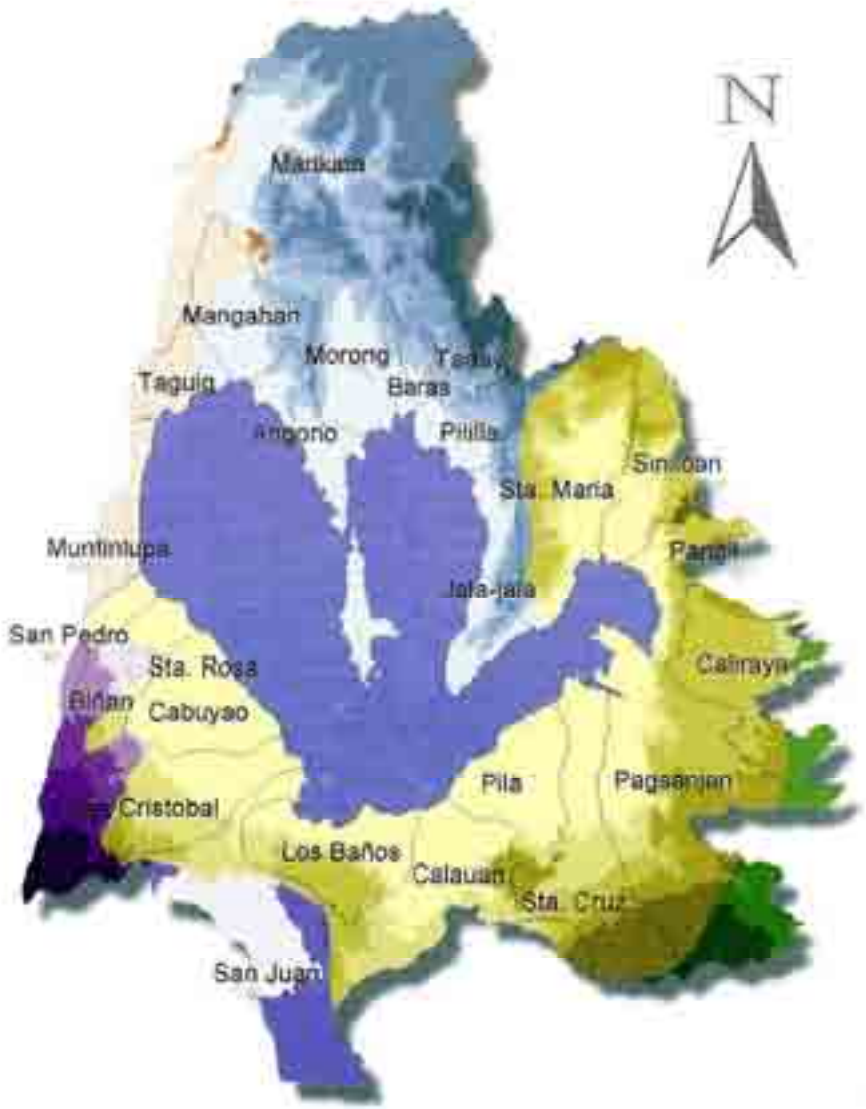
Outline of Presentation

- Background
- Man-made disasters
  - –Industrial Pollution
  - –Resource Extraction
  - –Deforestation/Land conversion
  - –Deforestation
  - –Shoreland Encroachment
- Impact on water quality
- Way Forward

LLDA's Administrative Jurisdiction

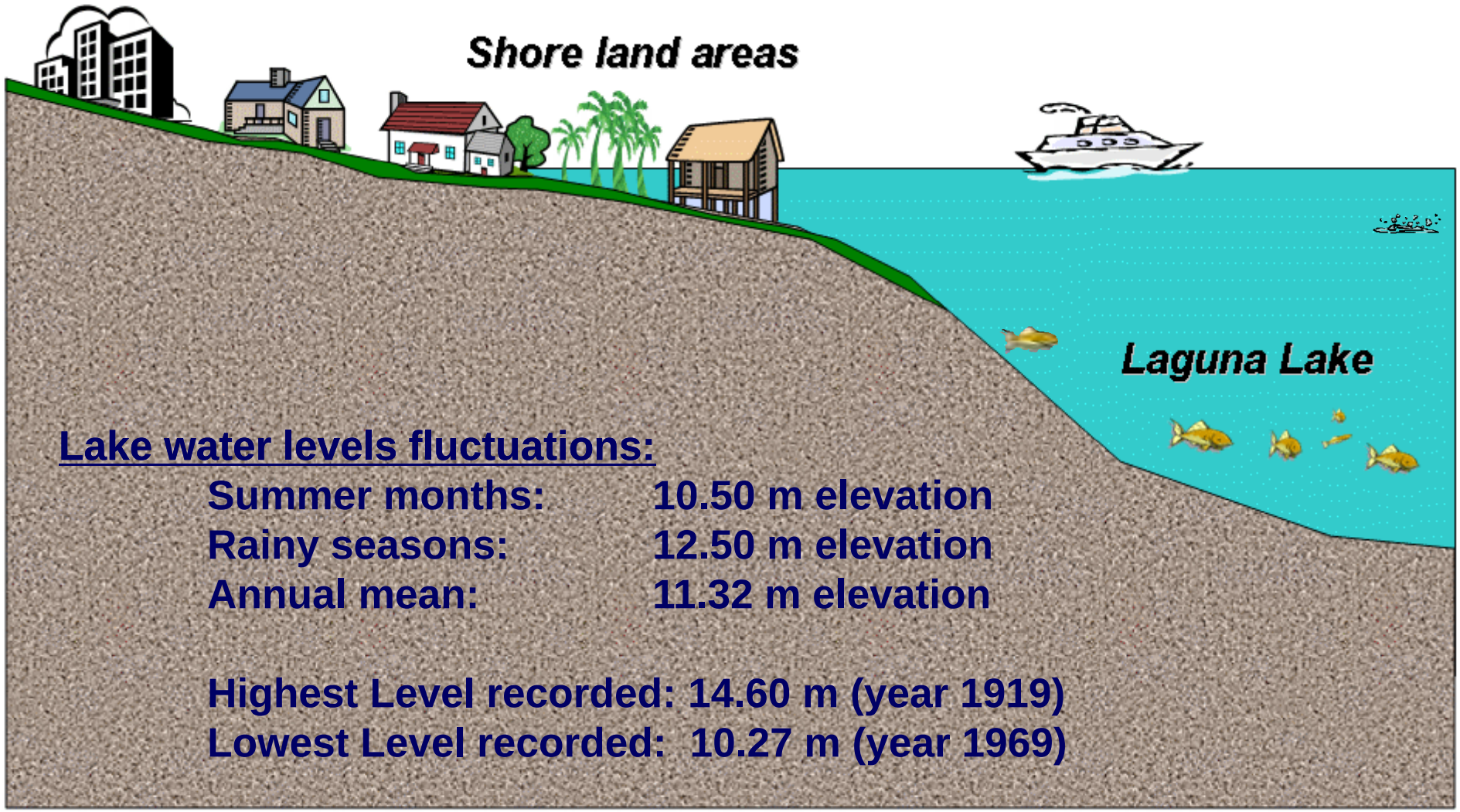
Rizal	=	13 towns and 1 city
Metro Manila	=	2 towns and 7 cities
Cavite	=	3 towns and 1 city
Batangas	=	2 towns and 1 city
Laguna	=	27 towns and 3 cities
Quezon	=	1 town
Laguna de Bay		

Total no. of cities	=	**14**
Lakeshore municipalities	=	**25**
Non-lakeshore municipalities	=	**22**
Total no. of barangays	=	**2,656**



Special feature of Laguna de Bay (Flood Reservoir)

- Laguna de Bay serves as a natural detention reservoir to 23 sub-basins comprising five provinces, including Metro Manila.
- During flood time, the Laguna Lake becomes the temporary storage of excess flood waters from Marikina River via Mangahan Floodway and Napindan Channel.

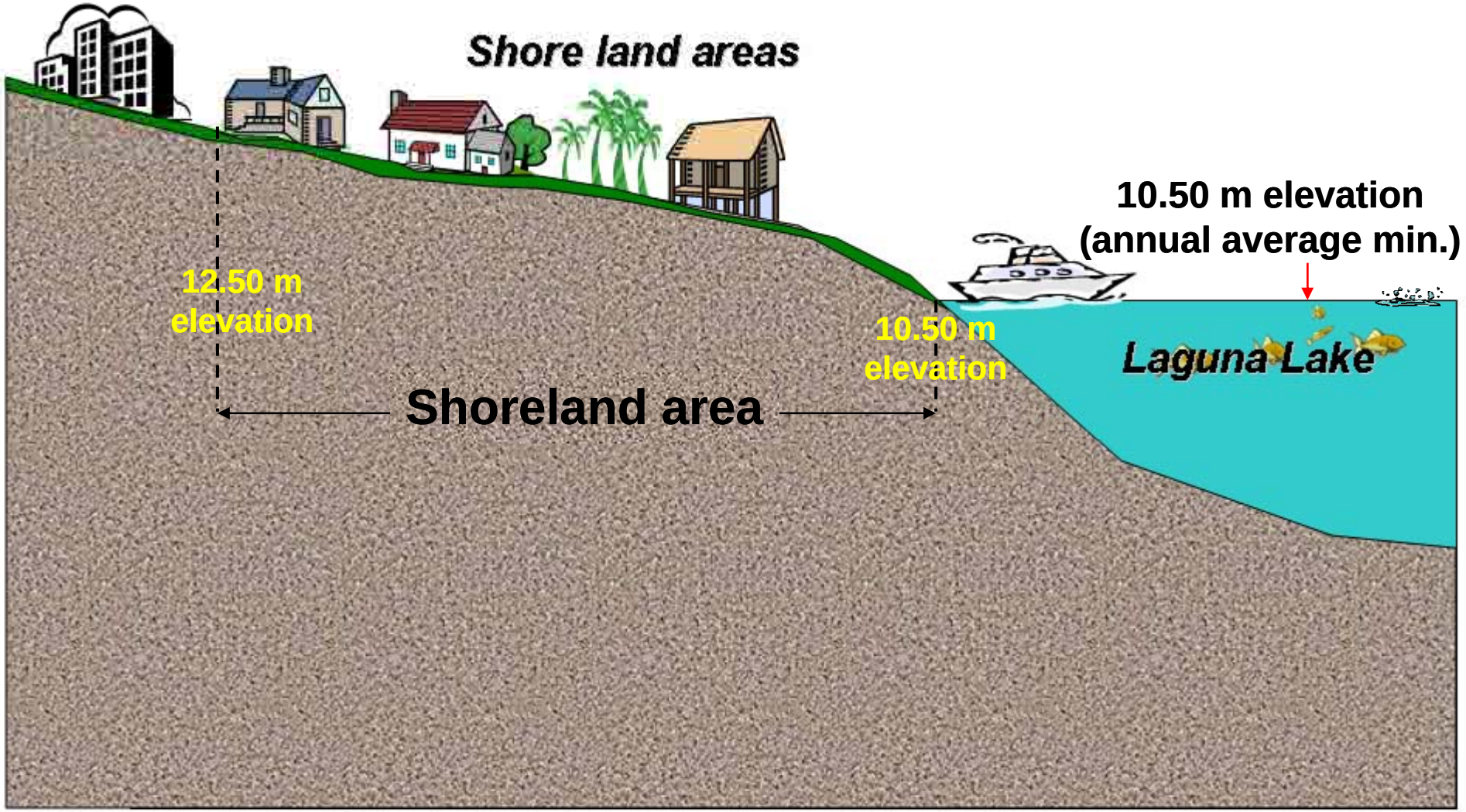


Lake water levels fluctuations:

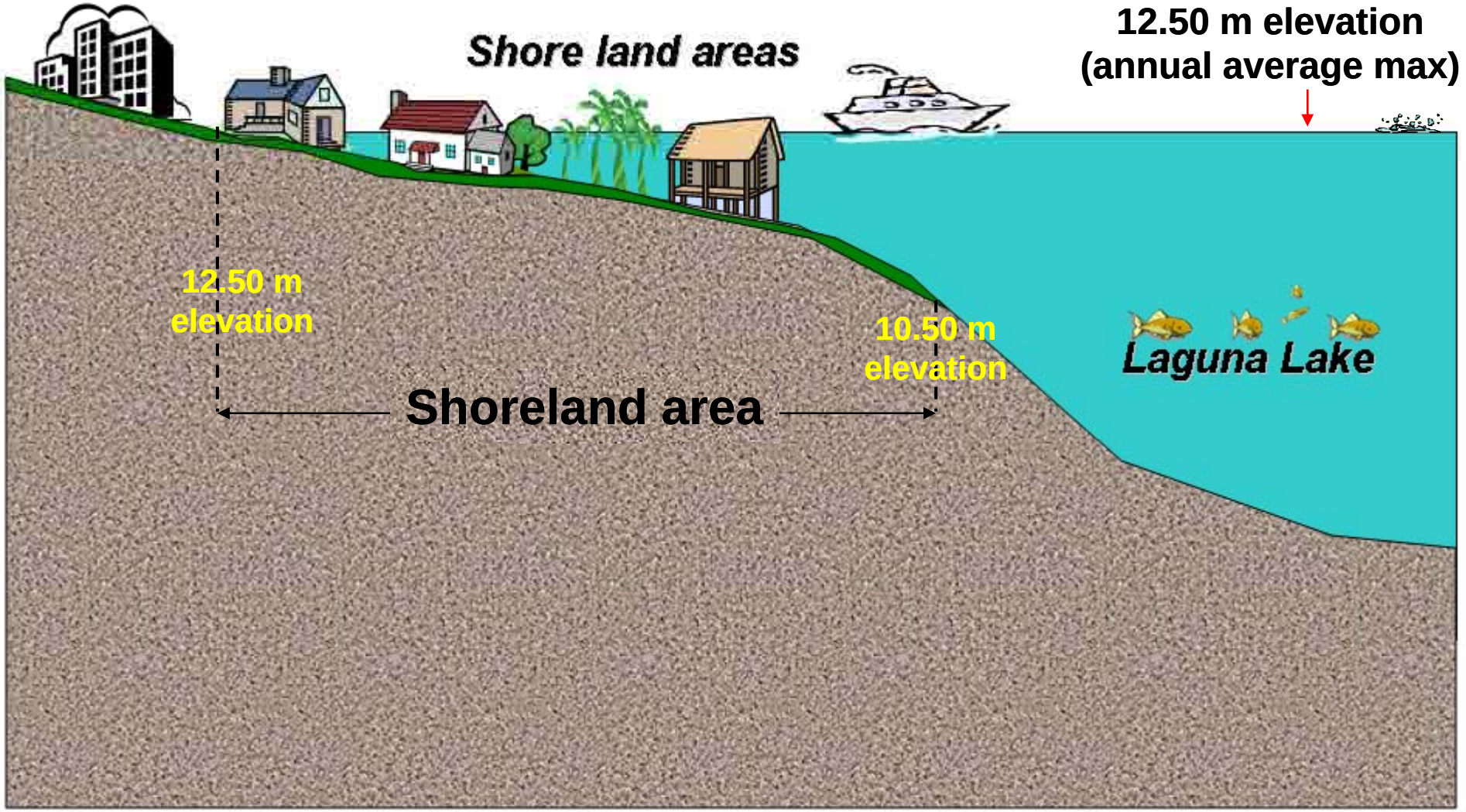
Summer months:	10.50 m elevation
Rainy seasons:	12.50 m elevation
Annual mean:	11.32 m elevation

Highest Level recorded: 14.60 m (year 1919)
Lowest Level recorded: 10.27 m (year 1969)

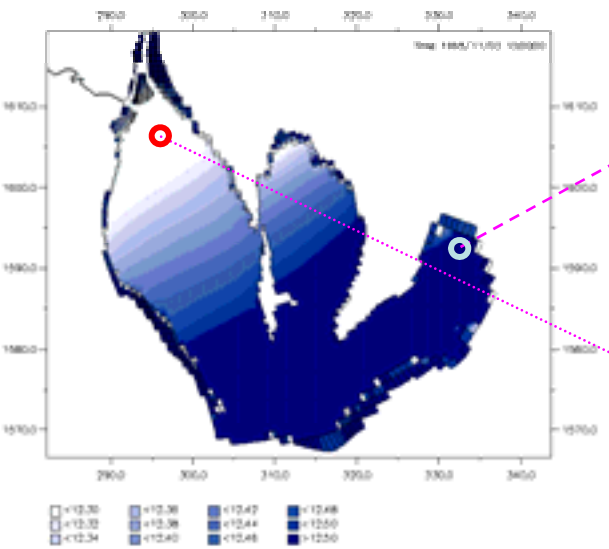
Lake water level during summer months

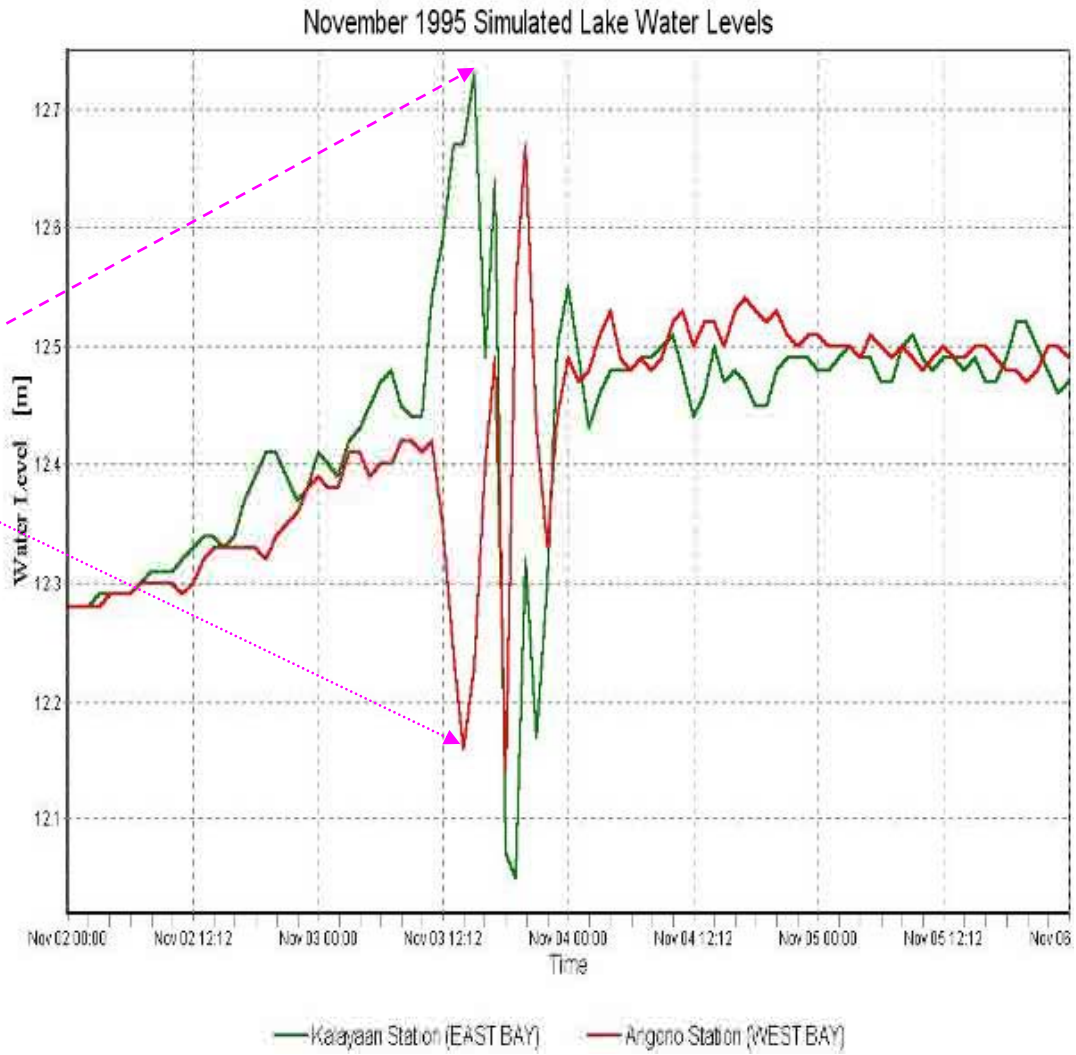


Lake water level during rainy season



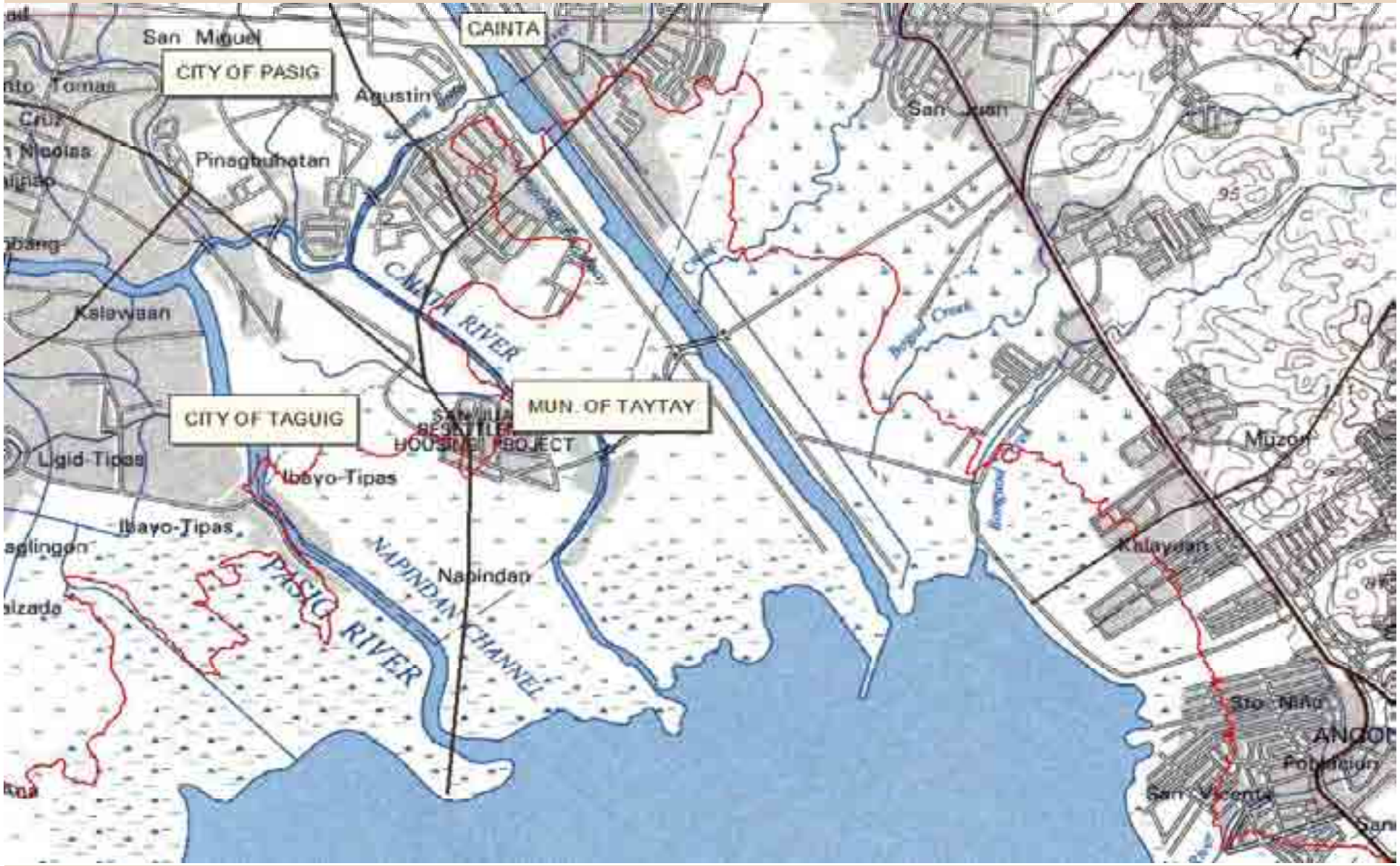
Variations in water level during typhoon events...





Due to the large surface area of the lake and its shallow waters, it is possible to have a storm surge in Laguna Lake waters (e.g. periodic rise and fall of the water level created by the stormy wind, as in a typhoon event).

TOPOGRAPHY MAP ALONG THE SHORELAND OF PASIG, TAGUIG, CAINTA, TAYTAY AND ANGONO

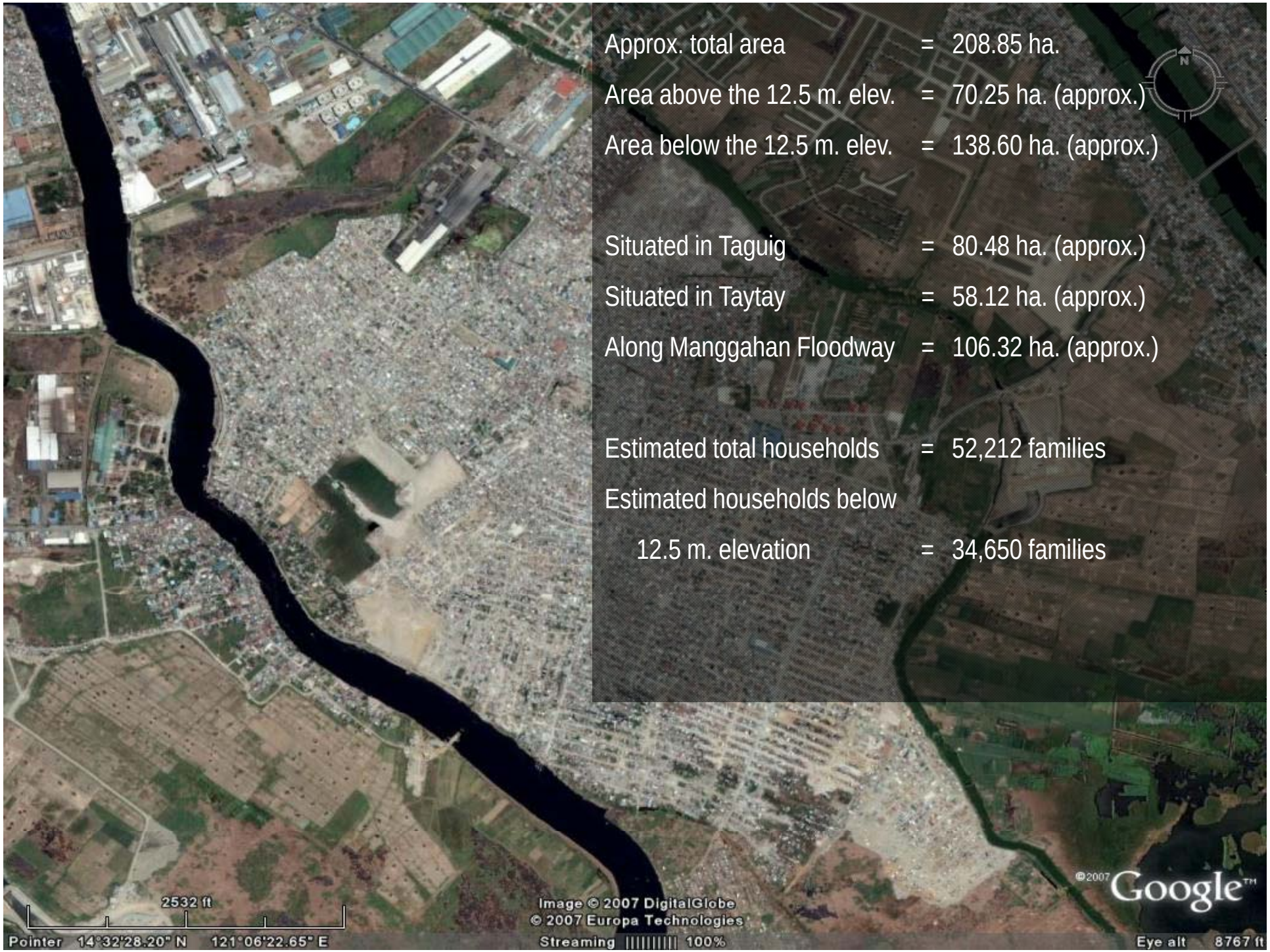


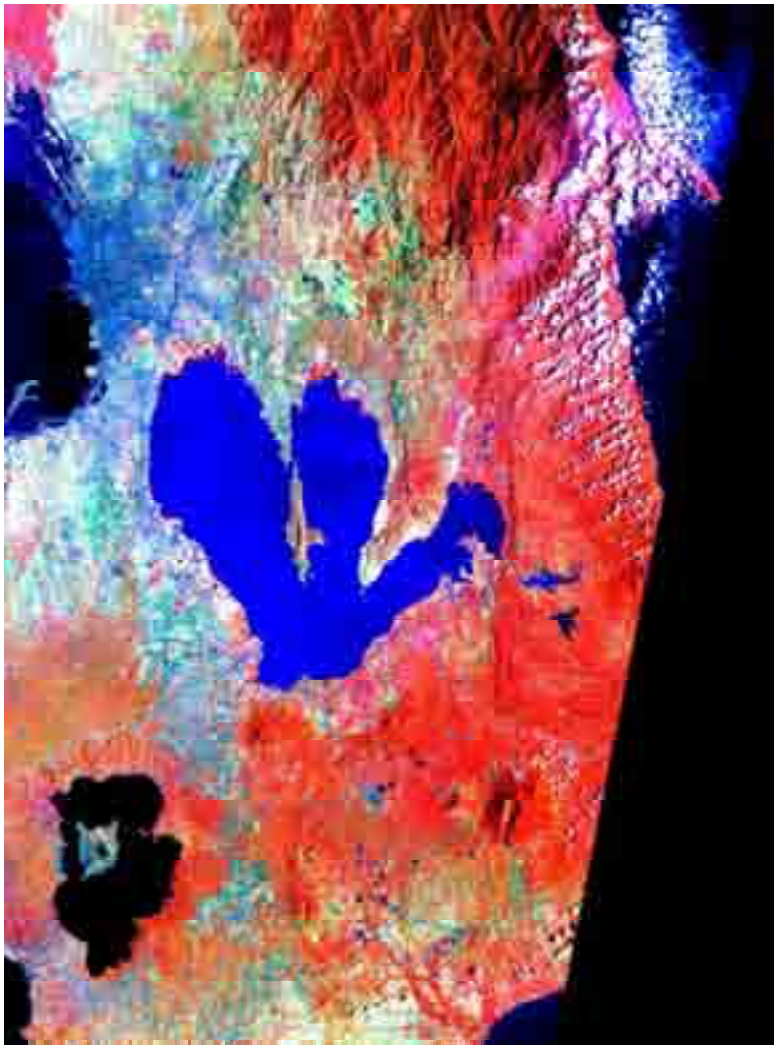
LEGEND: Municipal Boundary 12.5 m. reglementary elevation

The Manggahan Floodway

Built in 1986, the Mangahan floodway is a nine kilometer channel, with an average width of 220 m, with capacity of 2,400 m^3/s flow at 100 year flood.

Flood control operation under the *Effective Flood Control and Operation System (EFCOS)* of Metro Manila Development Authority (MMDA).


Approx. total area = 208.85 ha.
Area above the 12.5 m. elev. = 70.25 ha. (approx.)
Area below the 12.5 m. elev. = 138.60 ha. (approx.)
Situated in Taguig = 80.48 ha. (approx.)
Situated in Taytay = 58.12 ha. (approx.)
Along Manggahan Floodway = 106.32 ha. (approx.)
Estimated total households = 52,212 families
Estimated households below
12.5 m. elevation = 34,650 families
2532 ft
Image © 2007 DigitalGlobe
© 2007 Europa Technologies
©2007 Google™
Pointer 14°32'28.20" N 121°06'22.65" E
Streaming 100%
Eye alt 8767 ft



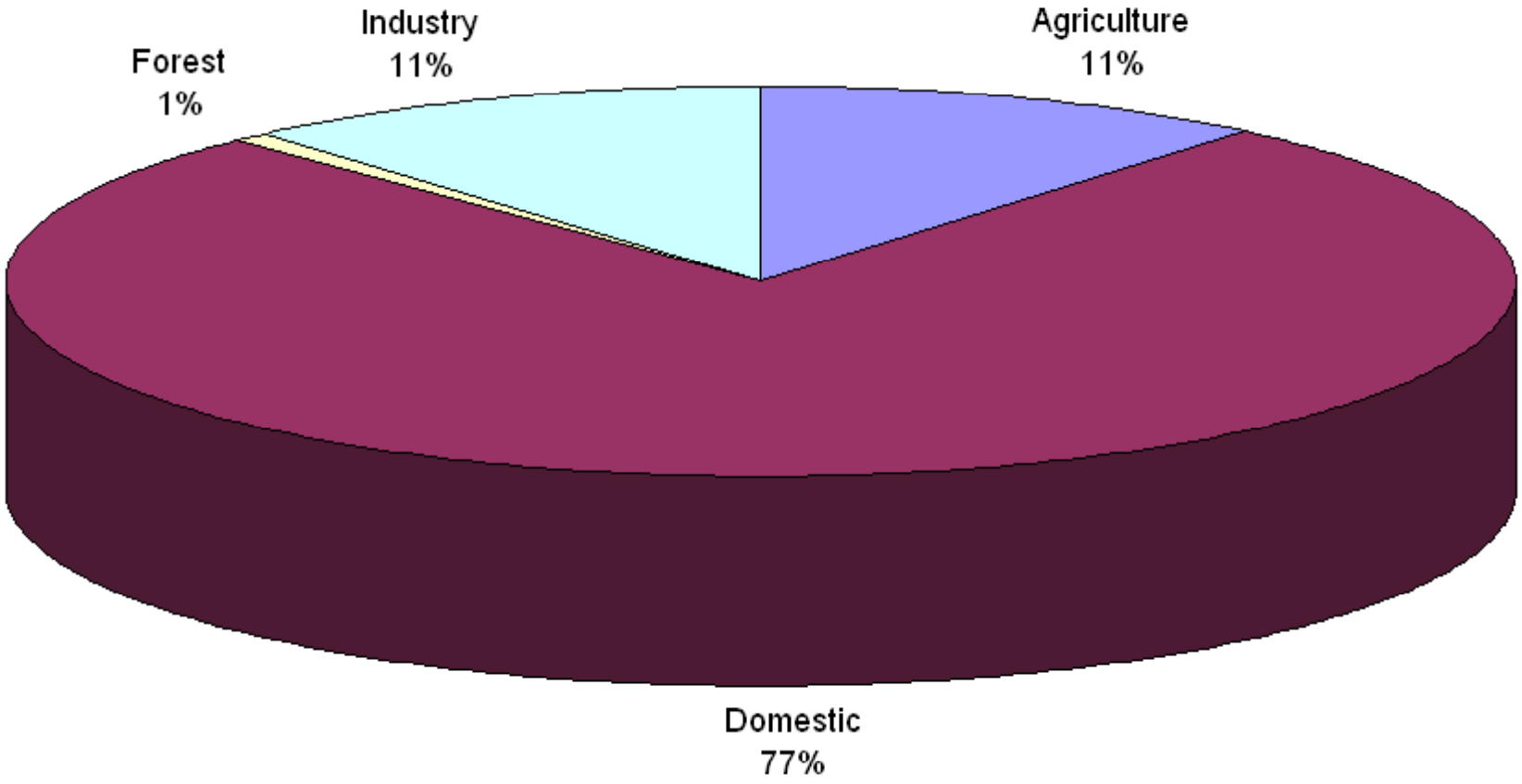
1993

2000


LAGUNA de BAY REGION
IS EXTREMELY STRESSED

BOD Waste Load Percentage Contribution, Year 2006

(76,202 MT/Year)



1. Causes

a. Industrial Pollution

The Lake has become the discharge point for human and industrial wastes from Metro Manila and other surrounding localities.

Of more than 10,000 small, medium, and large business establishments within the Laguna de Bay Region who produces wastes that ultimately settle in the lake

Sewerage canals in 61 cities and towns within Laguna de Bay Region empty into 21 tributary rivers which all drain into the lake. Manila Bay also channels polluted waters into the lake daily via the Pasig River due to tidal flows.

b. Resource Extraction - Water run-off from open spaces as a result of quarrying

c. Deforestation / land conversion

Subdivision / housing development as a result of land conversion


c. Shoreland Encroachment
Lower Alabang, Muntinlupa City

Aerial photos

Taken Octobe

Large shoreland areas to the western, southern and eastern parts of the lake remain vulnerable to flooding. A very long strip of shoreline of about half the lake perimeter requires protection from flood waters.

... from communities

Threats to Tributaries

...which could lead to economic loss

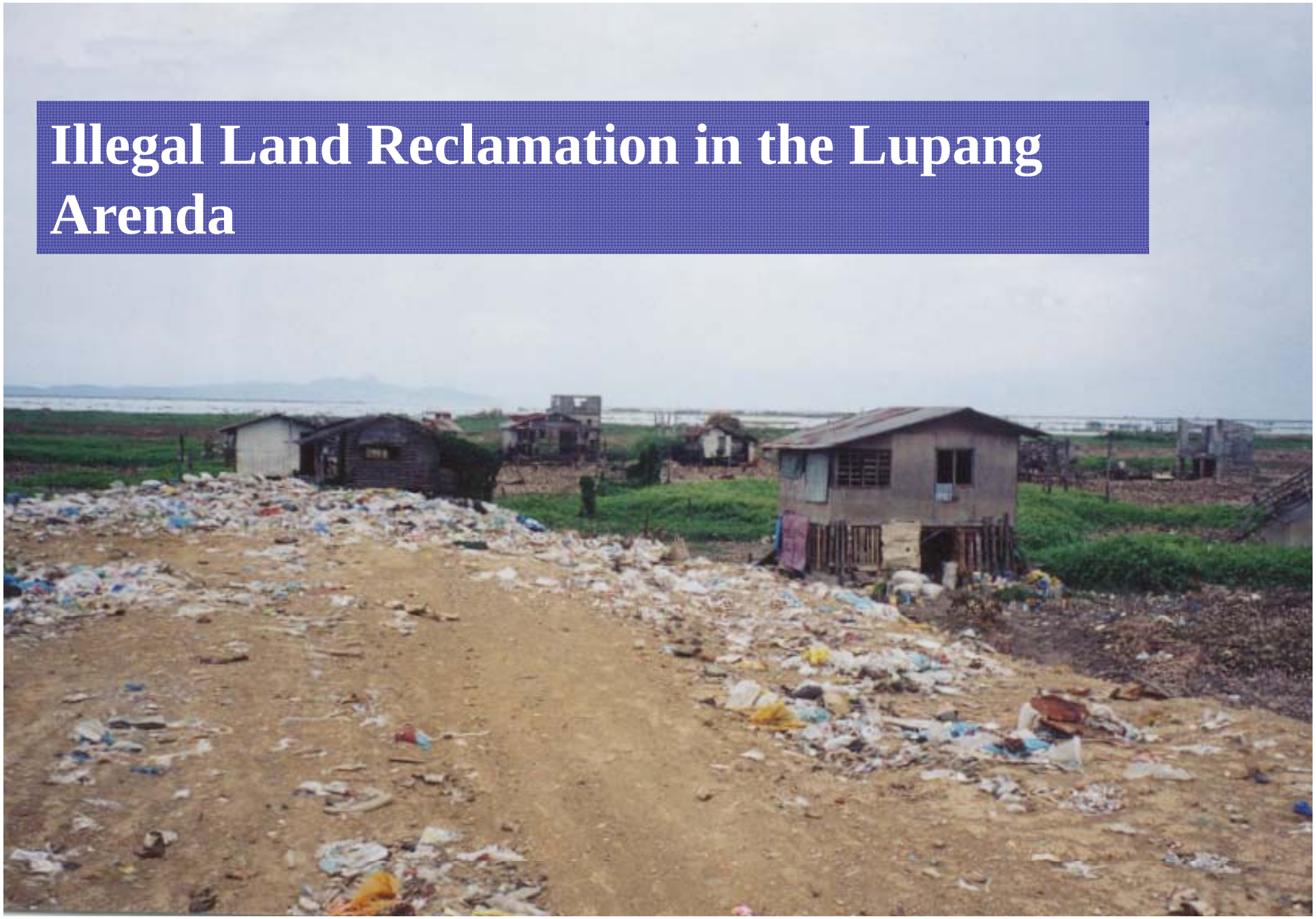
Illegal dumping of wastes

Santa Maria, Laguna

Angono, Rizal

Reference: LLDA Public Disclosure, 2007

Illegal Land Reclamation in the Lupang Arenda



- Conflicts existing among users/uses or the zoning priorities and jurisdictions.
- Encroachment in the lake is prevalent causing intrusions of pollutants into the lake water.

Population Pressure in Lake Shore

Without any mitigation measure in place, flooding will always recur during the wet season. The duration of flooding of these areas may be temporary but can range from few days to several weeks depending on the period and duration of the southwest monsoon rains that accompany the storm.

As one of the major waterways discharging to the lake, Mangahan Floodway is affected by the lake water stage.

Design high water level is at 14.00 m at the mouth of the floodway with 1.0 m free board to the top of the embankment.

With this water level condition, propagating wave from the lake can cost lives and destruction to the properties on the bank dwellers.

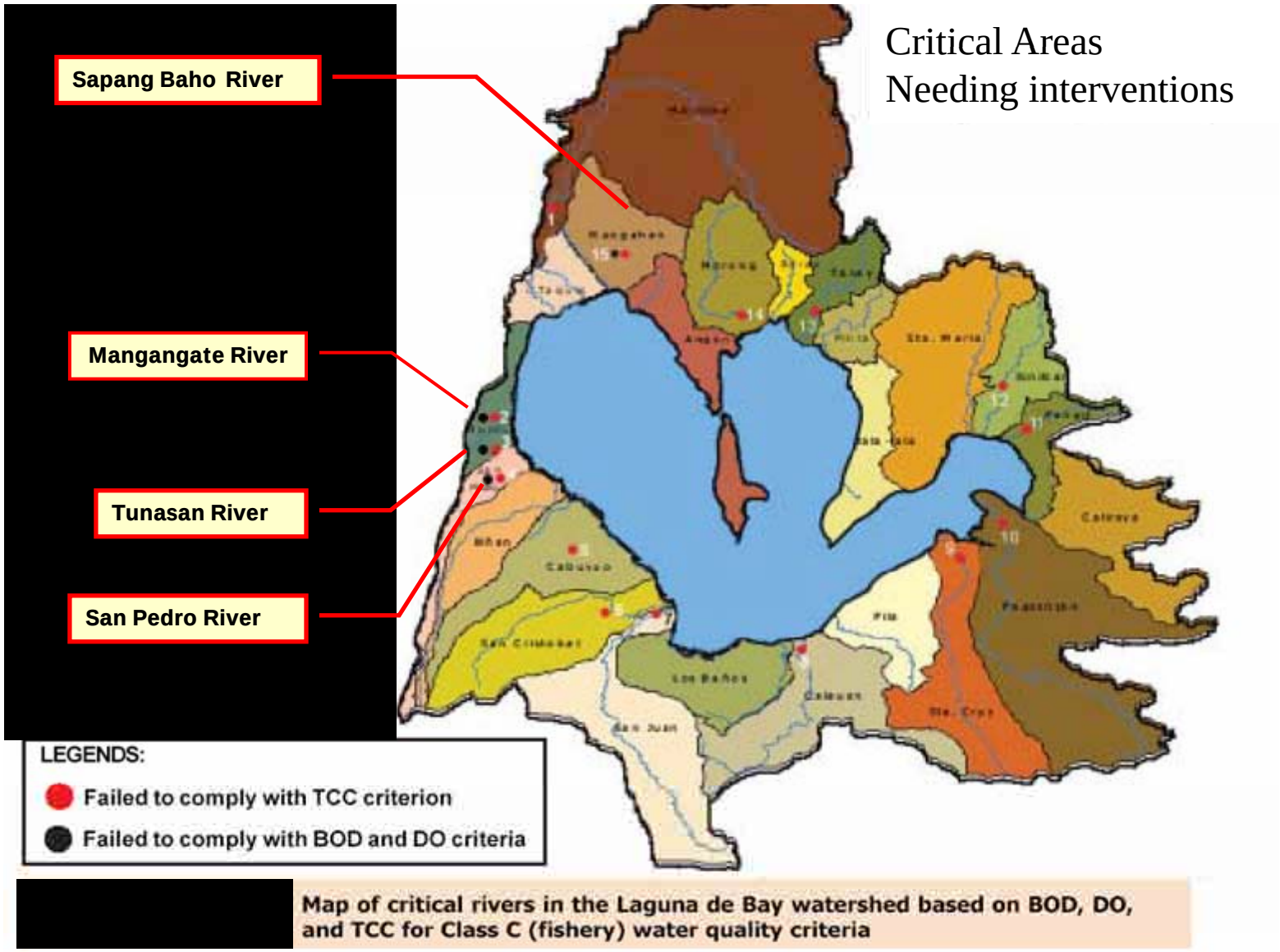
Land Slide: The Cherry Hills Tragedy, Antipolo City

- In the evening of August 2, 1999, a landslide occurred at Cherry Hills Subdivision in Antipolo City, Rizal Province.
- Fifty-nine persons (59) died, thirty-two (32) were endured and one (1) was missing. About 400 houses were destroyed and more than a hundred families were displaced.
- Investigations showed that the average slope in the area averages to 20%, enough to trigger down slope movement of unstable materials.
- Heavy rains and other man-made activities have resulted in the eventual collapse of the slopes. Indications of an impending slope failure occurred four to five months before the disaster.
- Early warnings on the part of the land developer and awareness of the residents on the changes in their surroundings could have saved lives and injuries.

Impacts on Water Quality

WATER QUALITY MONITORING

Laguna de Bay Stations – 5
Lake Early Warning Stations – 4
Tributary River Stations - 15

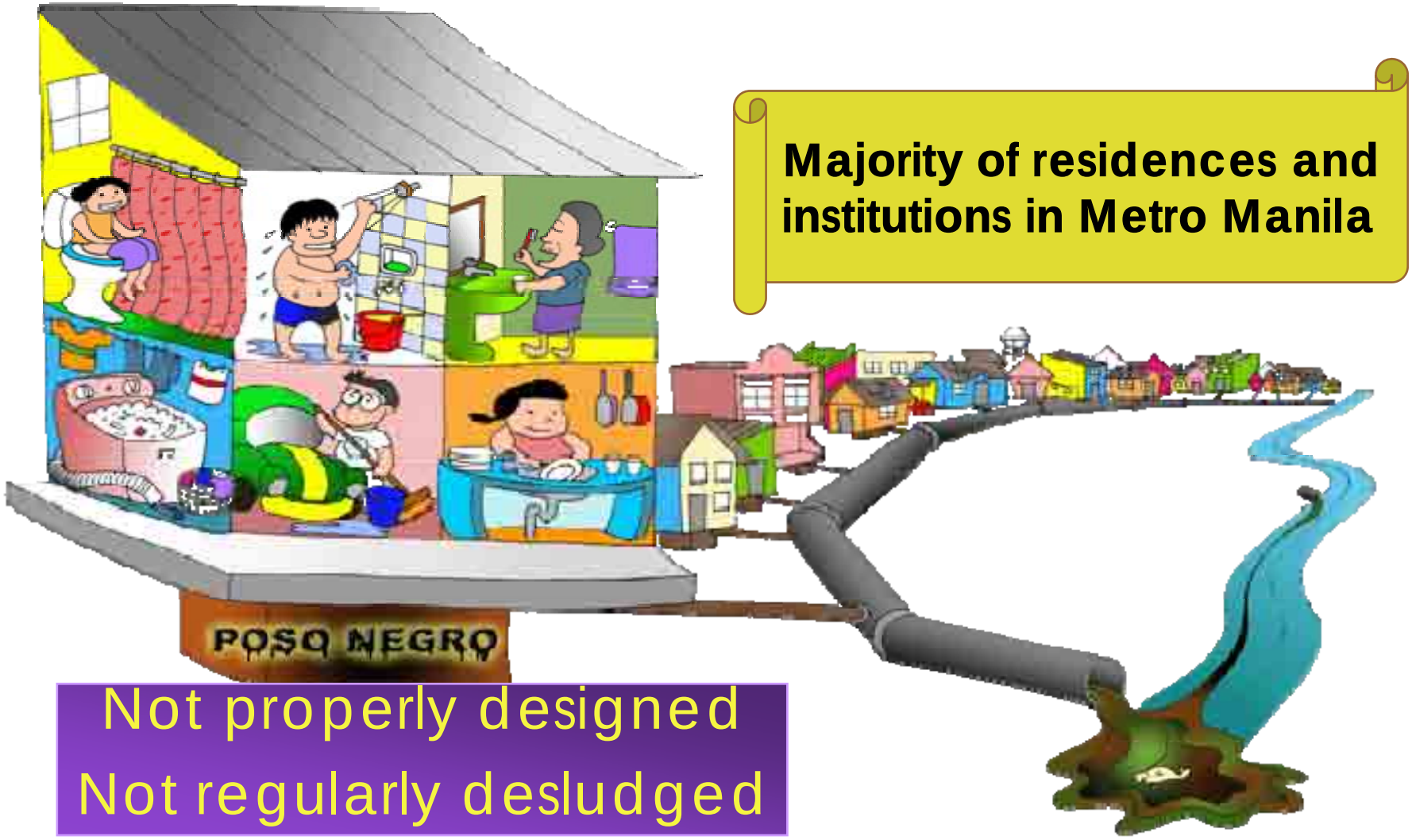


TCC – Total Coliform Count BOD-Biochemical Oxygen Demand DO – Dissolved Oxygen


Flooded shoreland area


Fishkills due to pollution

Health & Sanitation Problems



Majority of residences and institutions in Metro Manila

Not properly designed
Not regularly desludged

What is LLDA doing?

Way Forward thru Community Participation

The 4 completed, 8 being implemented and 9 Sub-Projects on approval/procument stages generated from 24 micro-watershed which have undergone the LEAP process:

Angono-Binangonan-Cardona Micro-watershed

14. Angono Integrated Solid Waste Mgt
15. Cardona Integrated Solid Waste Mgt

Muntinlupa Micro-watershed

San Pedro Micro-watershed

San Pedro-Biñan Micro-watershed

12. GMA Cluster MRF and Composting

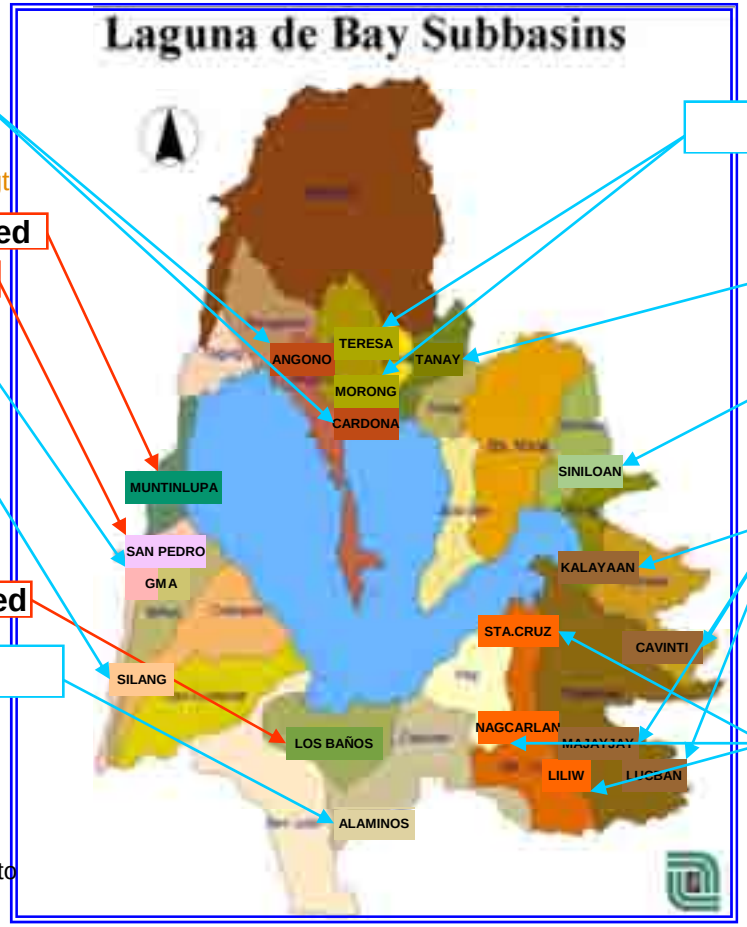
Sta. Rosa Micro-watershed

13. Silang MRF w/ Mechanized Composting Facility

Los Baños Micro-watershed

Alaminos-Bay-Calauan Micro-watershed

11. Alaminos Integrated Solid Waste Mgt



Morong-Teresa Micro-watershed

3. Morong Integrated Solid Waste Mgt
4. Teresa Integrated Solid Waste Mgt

Tanay Micro-watershed

1. Tanay Environmental Enhancement

Siniloan-Famy Micro-watershed

5. Siniloan Environmental Enhancement

Pagsanjan-Lumban Micro-watershed

2. Cavinti Eco-tourism
7. Kalayaan Integrated Solid Waste Mgt
8. Majayjay Falls Eco-tourism
16. Lucban Waterworks & Sanitation

Sta. Cruz Micro-watershed

6. Liliw Community-based MRF w/ Composting
9. Sta. Cruz Integrated Solid Waste Mgt
10. Nagcarlan Integrated Solid Waste Mgt

Legend:

1. Under construction
2. PGB approved and on-going DAED Preparation
3. Apprvoed by TRP, for endorsement to MDFO-PGB
4. Undergoing 1st level review
5. Undergoing FS preparation

Way Forward thru Strengthening Instruments and Approaches

Environmental Management Program
PERMIT SYSTEM / REGULATORY ACTIONS

LLDA achieves effective closure of point sources of pollution through regulatory and enforcement actions vs. erring industrial and other establish-ments and open dumpsites

Public Disclosure Program for the Bay Region

DISIPLINA ANG KAILANGAN!

LLDA Platforms for IEC/Stakeholders Feedback

LLDA sa Barangay

TV / Radio Appearance

Bike Caravan

Eco-camp for Students

Lake tour

LLDA Platforms for Stakeholders Feedback & Compliance Assistance

Annual Learning Forum

Laguna de Bay Environmen Monitor

Compliance Assistance Centers

Way Forward thru Partnerships

Physical Clean-up by EA

River Councils

River Seeding

Thank you for your attention!