

LAGUNA DE BAY BASIN 2020

Framework for the New Laguna de Bay Master Plan



Laguna Lake Development Authority



Vision Statement

We are the most respected natural resource administrator in the ASEAN region that sets the standards in environmental, social, and sustainable utilization and development of the Laguna Lake;

By year 2020, the multi-use lake serves the basin region for drinking water, transport, recreation, electric power, food and fisheries, flood control and urban land uses including tourism and housing projects where man responsibly use and nurture the lake and its surrounding watershed in the way that God has planned it...

RATIONALE

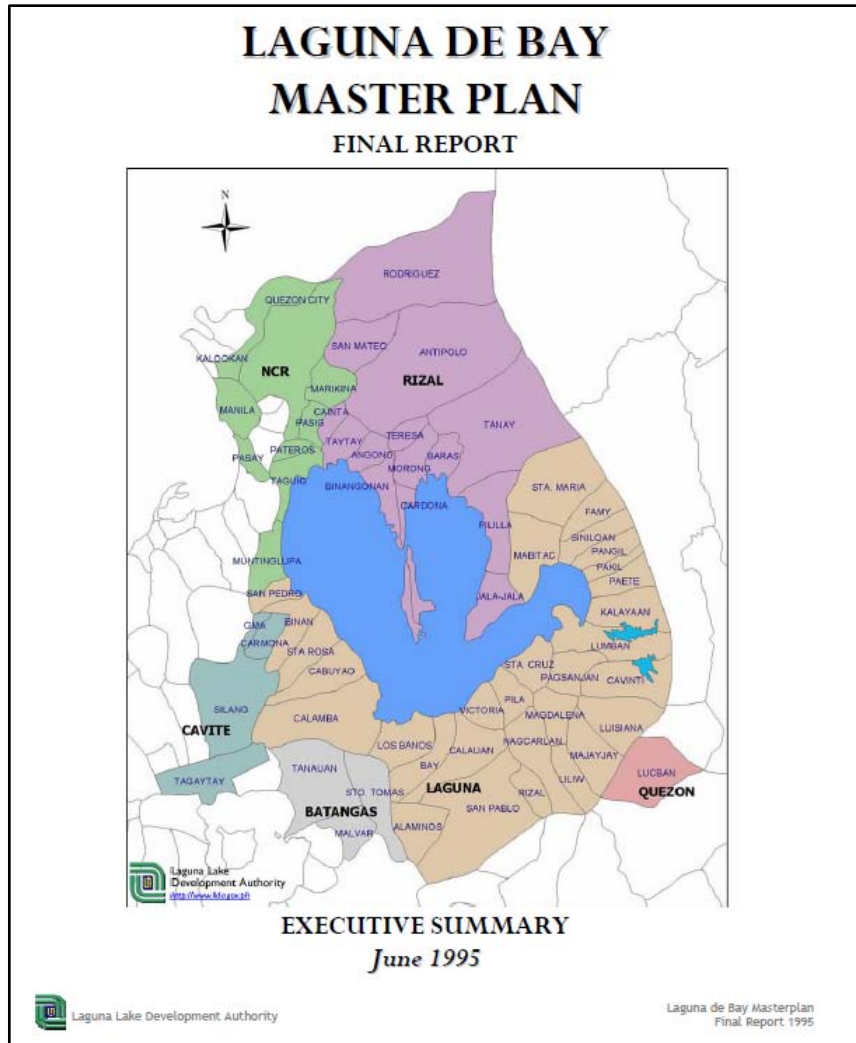
- The *1995 LLDA Master Plan*, after 16 years since it was developed, needs to be revisited to make it more relevant and attuned to present-day realities and challenges.

- Among others, the new tasks include:

Paradigm Enhancement – Strengthening LLDA’s regulatory mandate and intensifying the implementation of big-ticket programs and projects to push the economic growth and sustainable development of the Laguna de Bay Basin;

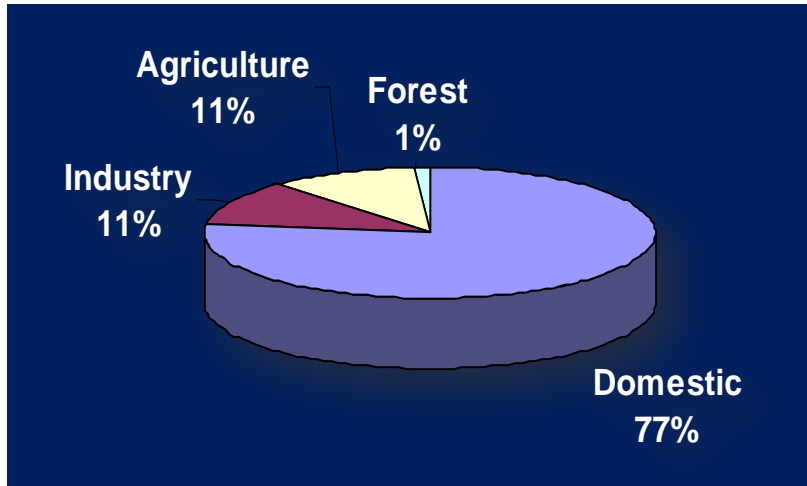
Financing the new Programs and Projects of LLDA – following the President's PPP advocacy, there is a need to attract more Public/Private Sector participation to join hands with LLDA in the development and implementation of such programs and projects; and

Climate Change – the need to climate-proof the Laguna de Bay basin.



STATEMENT of the PROBLEM

To address the concerns of the Lake basin:



i. Unabated discharge of pollutants, mostly from domestic sources



ii. Increasing development pressures in the region



iii. Denuded Watershed



iv. Indiscriminate land conversion

STATEMENT of the PROBLEM



v. Rapid siltation and sedimentation of the lake



vi. Uncontrolled reclamation, influx of informal settlers and illegal structures on the shoreland and riverbanks;



vii. Destructive resource extraction such as quarrying;

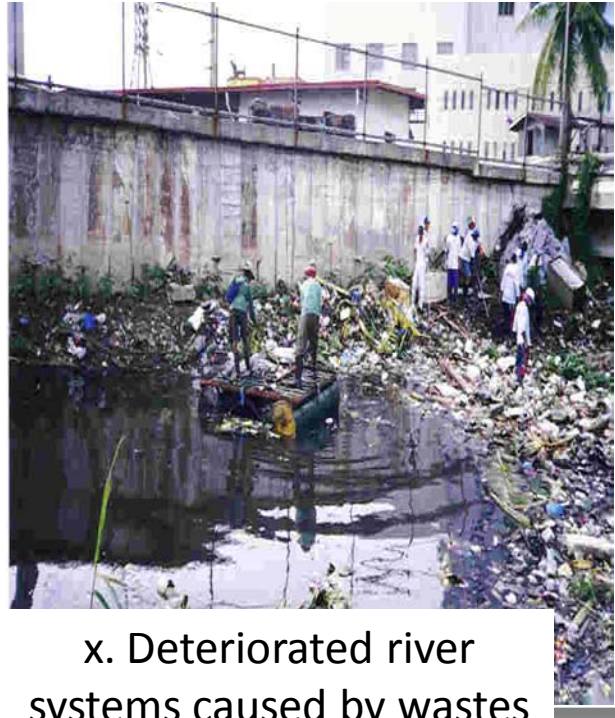


viii. Floods and Landslides

STATEMENT of the PROBLEM



IX. Groundwater depletion, salt water intrusion and subsidence



x. Deteriorated river systems caused by wastes dumping



xi. Food security and health risks arising from environmental degradation

STATEMENT of the PROBLEM



xii. Loss of biodiversity and introduction of invasive species;



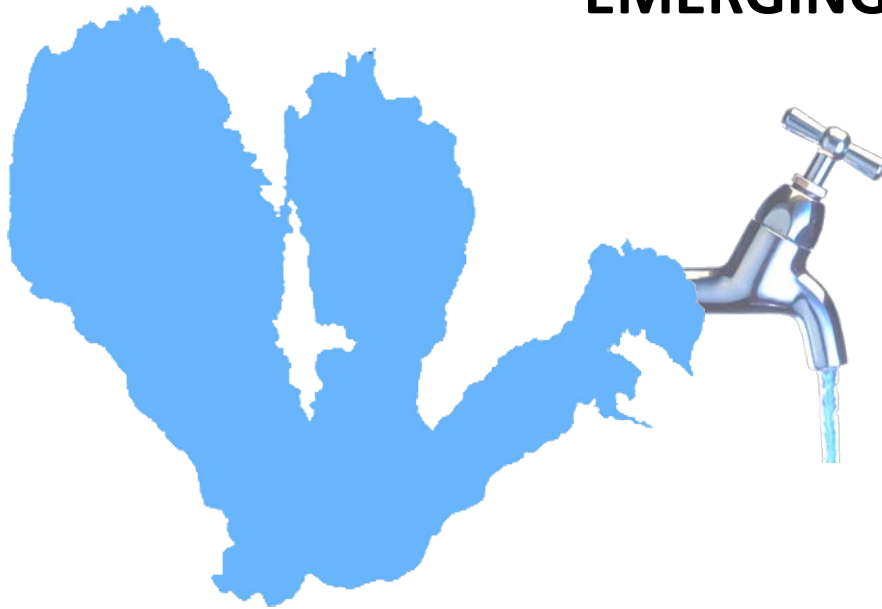
xiii. Lack of awareness of the stakeholders on the impacts of human activities; and

STATEMENT of the PROBLEM



xiv. Lack of a coherent financial engineering/investment program and unified institutional plans and policies

EMERGING ISSUES



- i. The need to tap Laguna Lake as a future major source of drinking water for Metro Manila and environs.



- ii. Conflict in water quality-quantity demands of various water users



- iii. Fragmented laws, rules and regulations resulting in inefficient institutional arrangements.

EMERGING ISSUES

- iv. The need to develop the shoreland for housing, commercial and eco-tourism purposes with due regard to environmental concerns and the rational comprehensive land use policy of LLDA.



- v. To deepen the Lake to increase its water-holding capacity



- vi. Public perception on the inseparability of flooding and state of the lake.



- vii. The desirability of long-term aquaculture in the lake as against open fisheries

EMERGING ISSUES



- viii. The need to strengthen partnership with DILG and LGUs in terms of law enforcement (in collaboration with PNP, AFP, PCG and the PHL Marines), passage of environmental ordinances and investing in environment-friendly infrastructures; and with other national government agencies like OP, DENR, DPWH, NEDA, DOTC, DTI, MMDA, NHA, LWUA, MWSS, DOE, NEA, NPC, NAPC, TESDA and DA.

ENVIRONMENTAL and SOCIO-ECONOMIC CONCERNS



- Resource and financial constraints needed to address the impacts of climate change;
- Lack of appreciation amongst stakeholders on their critical role as environmental stewards;
- Continuous in-migration and rapid population increase in the region, unemployment, poverty, food security and health-related issues;
- Need to develop alternative livelihood sources and opportunities for the marginalized sectors.

CORE OBJECTIVES

- Develop a strategic plan of action to push for the socio-economic development and growth without compromising the ecological integrity of the Laguna de Bay basin;
- Ensure food and health security thereby reducing and/or mitigating the extent or incidence of poverty in the **Laguna de Bay basin**;
- **Strengthen the LLDA to serve as the apex organization in the Laguna de Bay basin and empower the same to fully and effectively exercise its regulatory powers; and**
- **Promote and foster active collaboration and cooperation with Public/Private Sectors in the implementation of PPP projects designed to accelerate the sustainable development of the Laguna de Bay basin.**



OPERATIONAL OBJECTIVES:

- Characterize and assess current conditions of the Laguna de Bay basin;
- Determine and assess competing water resources demands of stakeholders vis-à-vis the need to maintain the ecological requirements of the Lake to sustain life;
- Promote open lake fishery production and conduct periodic lake seeding in Laguna de Bay to ensure and improve the income-generating capability of the fisher folks;
- Accelerate general economic activity through sustainable agricultural and industrial production thereby ensuring income and employment stability in the Laguna de Bay basin;
- Align current activities with relevant and acceptable technologies, emerging business modalities and developmental thrusts of the present Administration;
- Address issues and concerns on climate change adaptation and mitigation and Disaster Risks Reduction and Management (DRRM); and
- Harmonize the mandates of LLDA with existing laws that are relevant to its purposes and objectives.



POLICY FRAMEWORK and DIRECTION

- Managing and developing the Laguna de Bay and its watershed anchored within an integrated lake basin management approach, which encompasses integrated water resource management approach;
 - Conserving and protecting the resources within the Laguna de Bay basin by ensuring the maintenance of the optimal level of environmental quality and supporting all beneficial uses of such resources to realize a sustainable level of economic growth and development; and
 - Responding to the serious environmental and health risks that could adversely impact on the communities living in the basin by formulating a framework which would make them less vulnerable to such risks.
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- *Five key policy objectives:*
 - i. Participatory and community-based lake basin management approach;
 - ii. Partnership with stakeholders;
 - iii. Improved environmental compliance and broadened market-based instruments (MBIs);
 - iv. Improved environmental quality; and
 - v. Developing and sharing knowledge.



COMPONENTS of the NEW MASTER PLAN

1. *LAND RESOURCES*

- **INTEGRATED WATERSHED MANAGEMENT PLAN (IWMP)**

2. WATER RESOURCES DEVELOPMENT AND MANAGEMENT PLAN

3. ENVIRONMENT AND WATER-RELATED INFRASTRUCTURE DEVELOPMENT PLAN

4. SOCIO-ECONOMIC PLANNING AND DEVELOPMENT MANAGEMENT STRUCTURE

5. INSTITUTIONS AND INSTITUTIONAL ARRANGEMENTS

6. INFORMATION, EDUCATION AND COMMUNICATION (IEC) PROGRAM

COMPONENTS of the NEW MASTER PLAN

1. LAND RESOURCES

1.1. INTEGRATED WATERSHED MANAGEMENT PLAN (IWMP)

Objectives

- i. Develop a watershed restoration and land use plan; and
- ii. Formulate a framework to enhance institutional arrangements with LGUs and other stakeholders to include the design of conflict management mechanisms.



COMPONENTS of the NEW MASTER PLAN

2. WATER RESOURCES DEVELOPMENT AND MANAGEMENT PLAN

Objectives

- i. Improve effectiveness, efficiency and coverage of the Environmental User Fee System (EUFS) and Public Disclosure Program;
- ii. Invest in and/or upgrade septage management, sewerage systems, and wastewater treatment facilities;
- iii. Optimize the development and utilization of water resources to ensure equitable access to all users; and
- iv. Promote sustainable abstraction of water from the Lake.



COMPONENTS of the NEW MASTER PLAN

3. *ENVIRONMENT and WATER-RELATED INFRASTRUCTURE DEVELOPMENT PLAN*

Objectives:

- i. Implement necessary infrastructure programs and projects to hasten the sustainable development of the Laguna de Bay Basin;
- ii. Assert the full authority of LLDA to supervise and monitor the efficient and effective implementation of these infrastructure development programs and projects; and
- iii. Help LGUs and other government instrumentalities to set up and/or improve environmental infrastructure.



COMPONENTS of the NEW MASTER PLAN



4. *SOCIO-ECONOMIC PLANNING and DEVELOPMENT MANAGEMENT STRUCTURE*

Objectives :

- i. Promote, in collaboration with LGUs and other national agencies, the sustainable development of the Laguna de Bay Basin with emphasis on food security, employment generation, poverty alleviation, health and sanitation, and comprehensive relocation and resettlement of informal settlers; and
- ii. Pursue development initiatives and interventions within the context of integrated lake basin management approach.



COMPONENTS of the NEW MASTER PLAN

5. *INSTITUTIONS and INSTITUTIONAL ARRANGEMENTS*

▪ OBJECTIVES

- i. Promote, enhance and improve the institutional capacity of all stakeholders including more importantly LGUs to implement, in collaboration and cooperation with LLDA, development projects and programs; and
- ii. Adopt a joint stewardship mechanism with various stakeholders and affected communities to ensure the beneficial and optimal use and utilization of economic resources within the Laguna de Bay basin in accordance with the integrated lake basin management approach.



6. *INFORMATION, EDUCATION and COMMUNICATION (IEC) PROGRAM*

Objective

Strengthen the LLDA IEC Program to, among others, promote greater awareness of the current regulatory and developmental mandate-activities of the Authority, and increase appreciation amongst stakeholders of the value of the economic resources in the watershed and the benefits that could be derived therefrom if such resources were to be wisely used and utilized.



Cluster Approach for Master Plan Updating and Implementation

- Water Supply and Sanitation
- Watershed Management
- Shoreland Development and Illegal Settlements
- Flood Control and Disaster Risk Reduction & Management
- River Rehabilitation
- Lake Basin Transport System & Eco-Tourism
- Materials Recovery Facility and Sanitary Landfills
- Information, Education, and Communication Campaign
- Institutional Partnership
- Water Quality
- Fisheries Development
- Lake Dredging
- Renewable Energy

1. WATER SUPPLY AND SANITATION

Mission:

To promote equitable access to safe, adequate and sustainable water resources for all stakeholders in the Laguna de Bay basin.



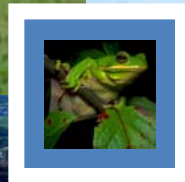
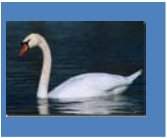
1. WATER SUPPLY AND SANITATION

Construction of additional
Water Abstraction Projects *P7B*
in two sub-watersheds



DEVELOPING NATURAL WASTEWATER TREATMENT SYSTEMS AROUND LAGUNA LAKE

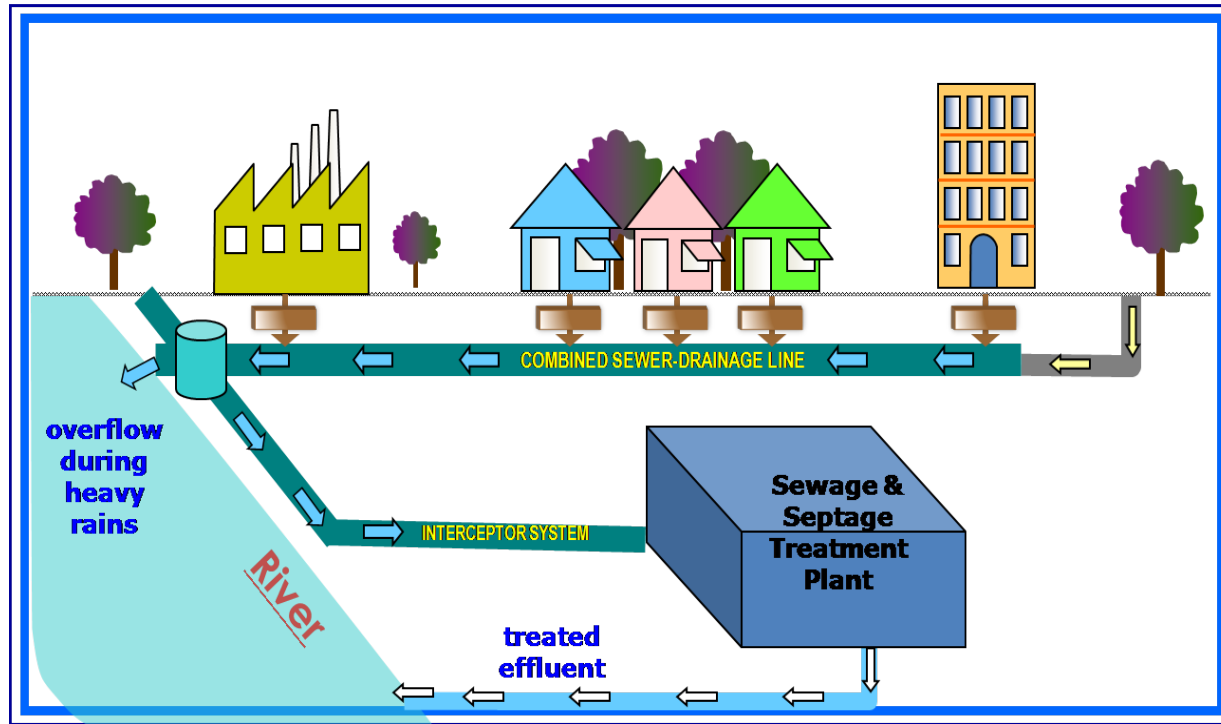
PHP200



**USAID-Eco-Asia-Chia Nan University-LLDA –
Calamba Water District-LGU Collaborative Partnership**

- Construction of water processing and treatment plant

P3B



Courtesy of Manila Water Company Inc.

2. WATERSHED MANAGEMENT

Mission:

To establish 24 Sub-Watershed Management Councils in the Laguna de Bay Basin to implement the Sustainable and Integrated Lake Basin Management Program (SILBMP).



2. WATERSHED MANAGEMENT



- Reforestration

P3B

- Social mobilization

P150M

Fortification and stabilization of river embankments using gabions, ripraps, and sabo dams



P2B

Sabo Dam

3-Cascade Micro Dam

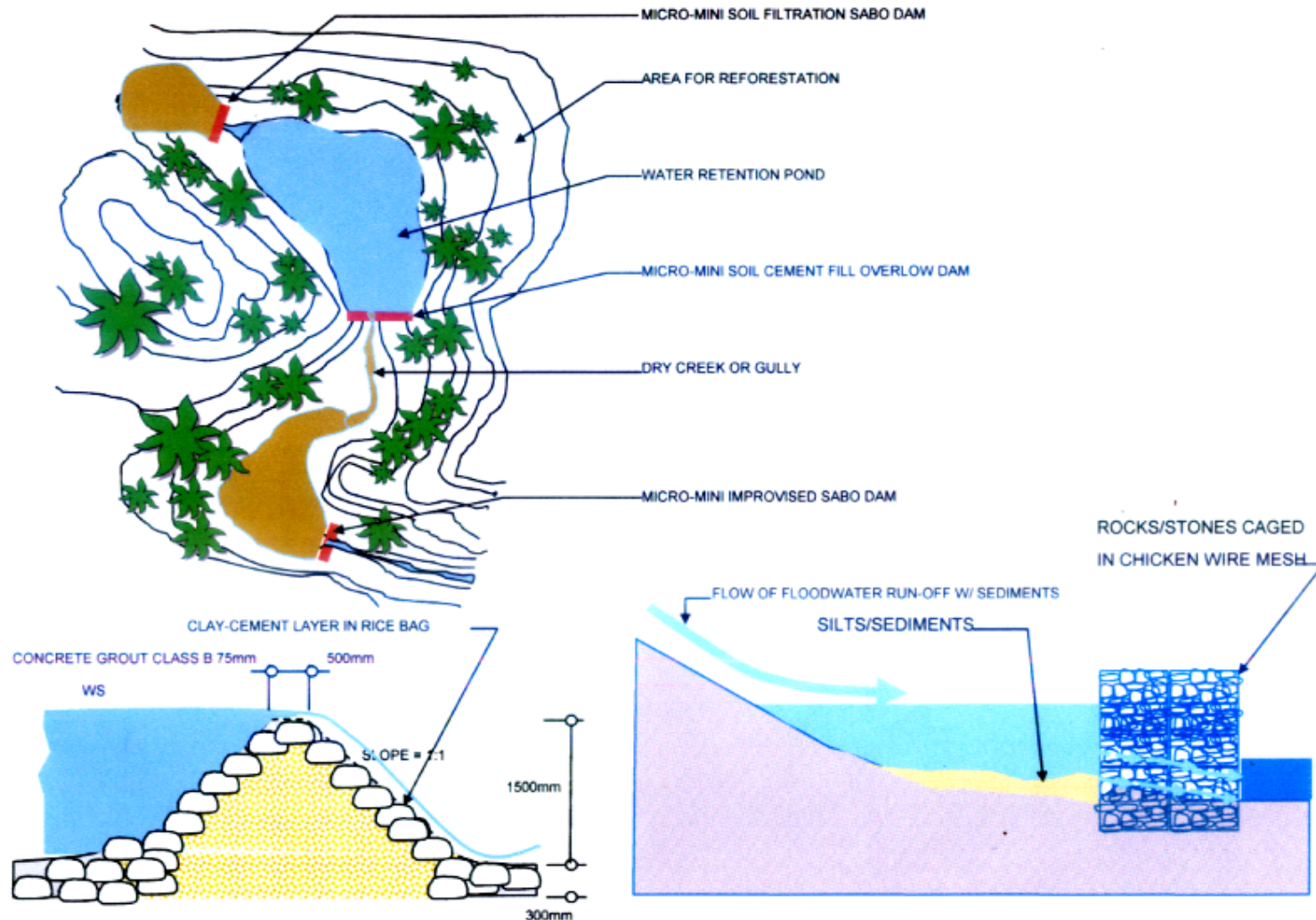


FIG 3. TYPICAL SECTION OF MIRO-MINI IMPOUNDING DAM

FIG 3. TYPICAL SECTION OF IMPROVED SABO DAM

3. SHORELAND DEVELOPMENT & ILLEGAL SETTLEMENT

Mission:

To optimize the economic value of shoreland areas as buffer zone of the Lake through sound development initiatives and practices, starting with the titling thereof in favor of the LLDA to reduce its susceptibility to abuse and illegal exploitation.



RELOCATION OF COLONIES OF INFORMAL SETTLERS ALONG THE SHORELAND OF LAGUNA DE BAY



Malaban, Biñan, Laguna - 6,800 Families



Sinalhan, Sta. Rosa, Laguna - 4,800 Families



San Juan, Taytay, Rizal (LUPANG ARENDA)
60,000 Families



Cluster of informal settlers located in different
areas along the shoreland - 10,440 Families

RELOCATION COST/HOUSEHOLD = Php 200,000/ household

ESTIMATED NO. OF HOUSEHOLD = 82,040

TOTAL COST = Php 6,408,000,000



- Provision of socialized housing (10-year implementation)

P16.5B

- Establishment of waterlily/ livelihood centers

5M

Waterfront Development Projects



Art Centers



Potential Art Center Sites:

- Angono
- Paete
- Los Banos



800M

Eco Parks



Establishment of Ninoy and Cory Eco Parks



500M

4. FLOOD CONTROL & DISASTER RISK REDUCTION & MANAGEMENT

Mission:

To develop effective and cost-efficient flood control programs and projects integrated into a developmental process and adopting disaster risk reduction and management approaches to climate-proof the Laguna de Bay basin.



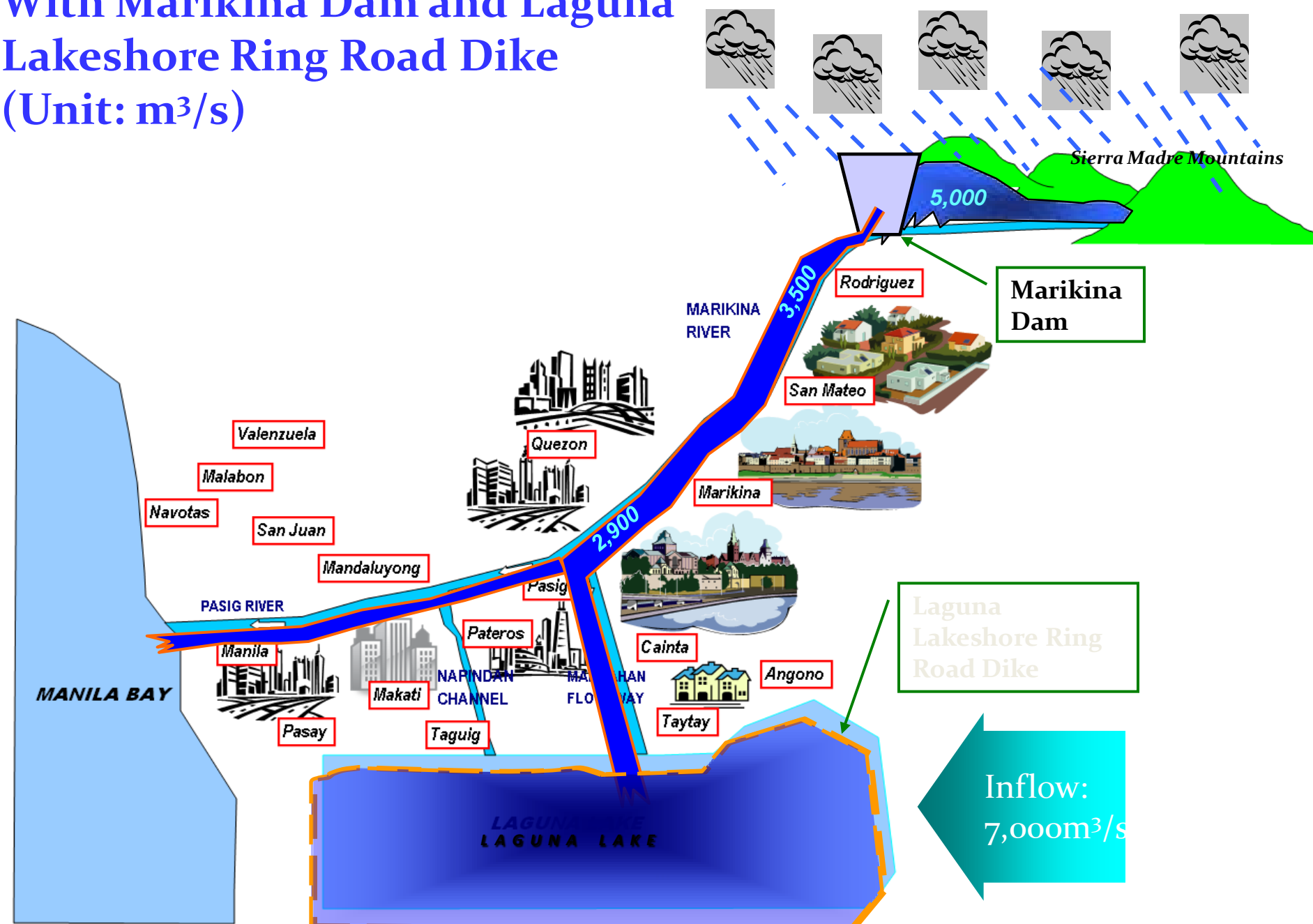
MARIKINA DAM - at Montalban Gorge

P4.5B



With Marikina Dam and Laguna Lakeshore Ring Road Dike

(Unit: m³/s)

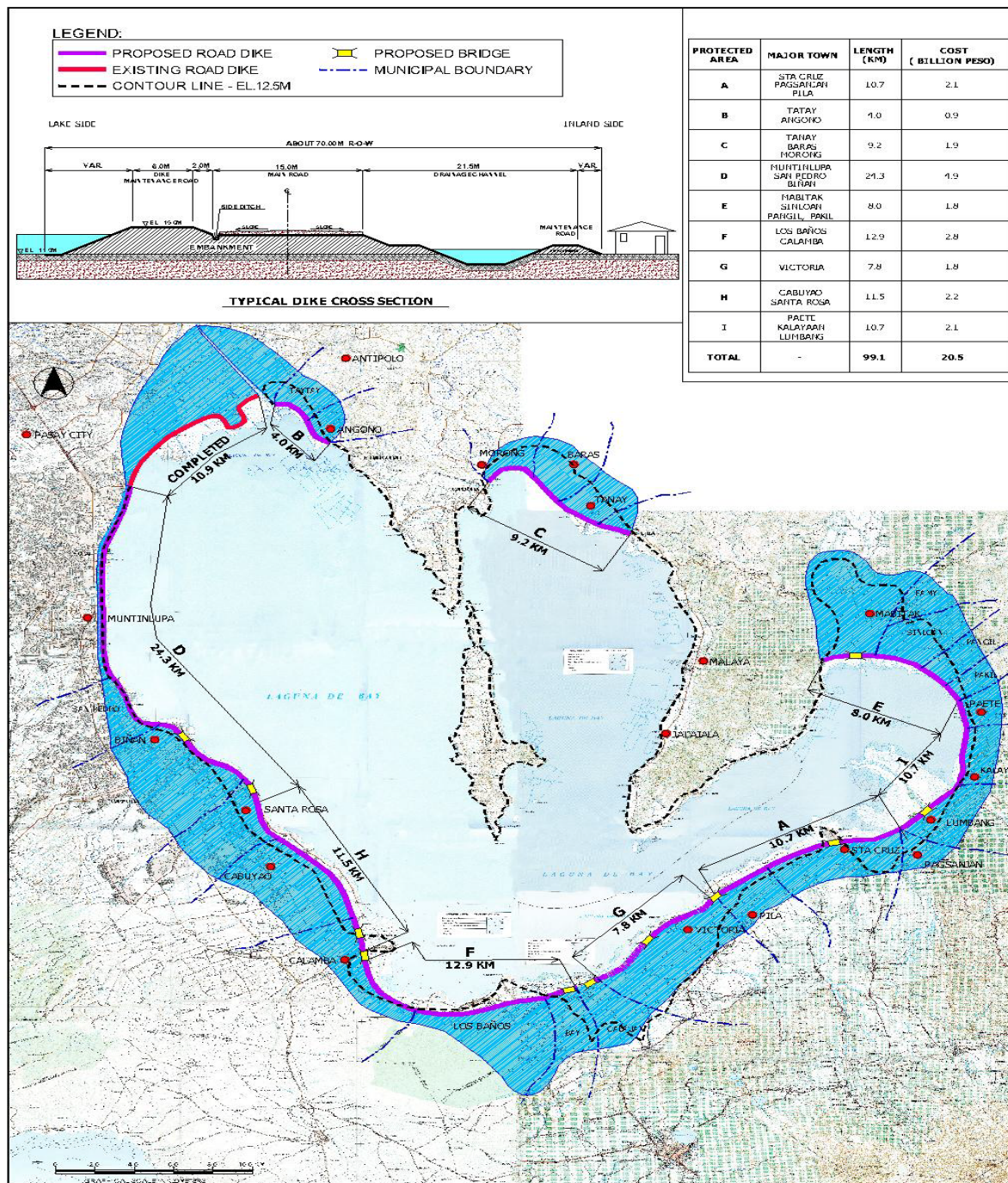


P28B

LAKESHORE RING ROAD DIKE

- Total Length : 99.10 km
- Pumping Station : 10 sites
- Dike Road : 4 lanes
- Bridges : 11 bridges
(1.1 km in total)
- Const. Cost. : P 23.58 B
- Const. Period : 10 years
- EIRR : 17.6 %
(including the benefits from the use of lakeside dike road)

Total volume to be stored in Laguna Lake by the Road Dike is 1.17 B m³ (El 12.5m-13.8m)



**FLOOD CONTROL FOR LAGUNA LAKE
(ROAD DIKE SCHEME)**

Construction of Paranaque Spillway



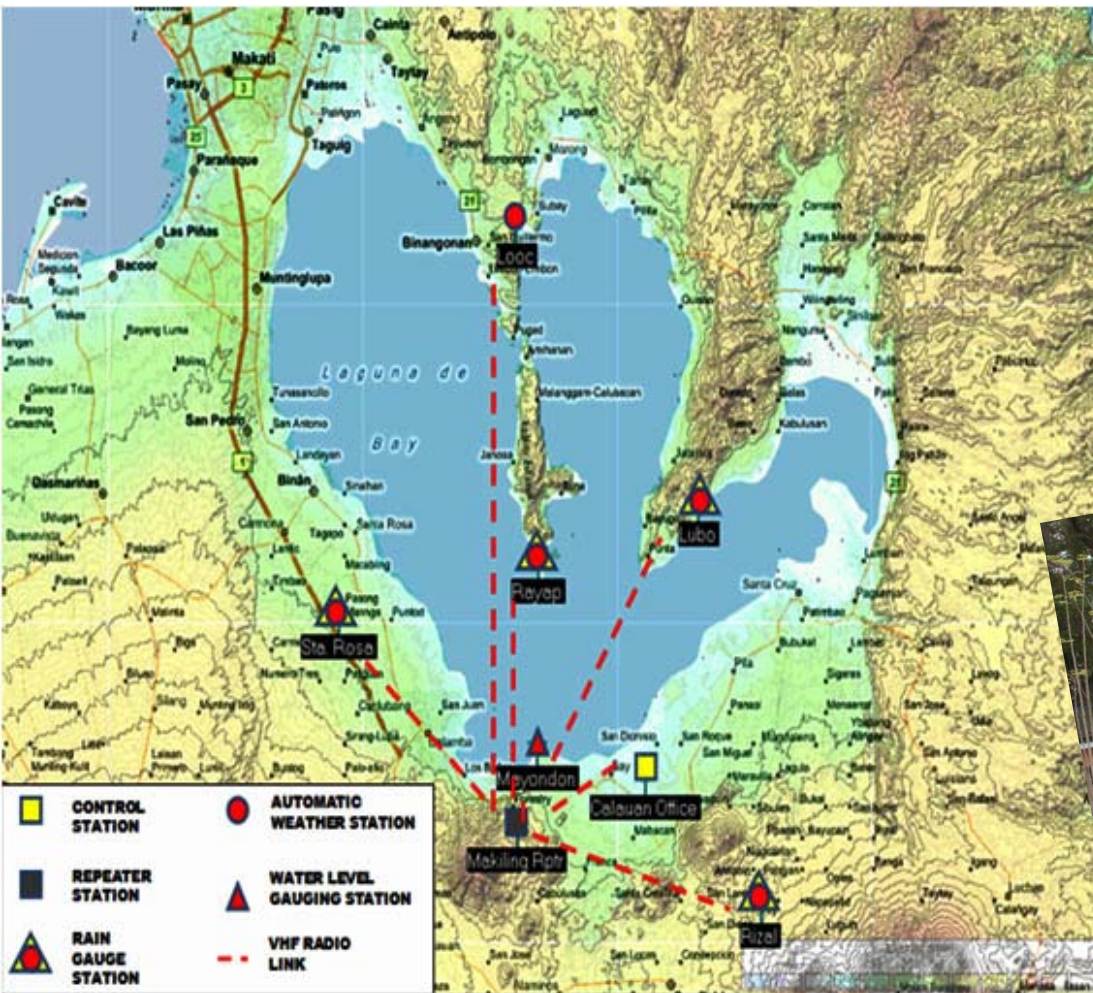
50B



Disaster Risk Reduction Measure to Prevent Loss of Life and Destruction of Properties

Will provide at least 5-hour minimum lead time to forecast flooding in vulnerable communities in coordination with DOST-PAGASA and National Disaster Risk Reduction Management Council

PHP 50M



Disaster Risk Reduction Measure to Prevent Loss of Life and Destruction of Properties

TOTAL = PHP 7M

- Conduct Feasibility Studies on Flood Control and Mitigation in coordination with DPWH
- Support the LGUs in the preparation of their Disaster Preparedness and Disaster Risk Reduction and Management Plan

5. RIVER REHABILITATION

Mission:

To rehabilitate and transform the river systems flowing towards the Lake into eco-parks in partnership with the private sector to restore the intrinsic beauty of the environment.



Bird's eye view of the La Mesa Park



Entrance to the La Mesa Park

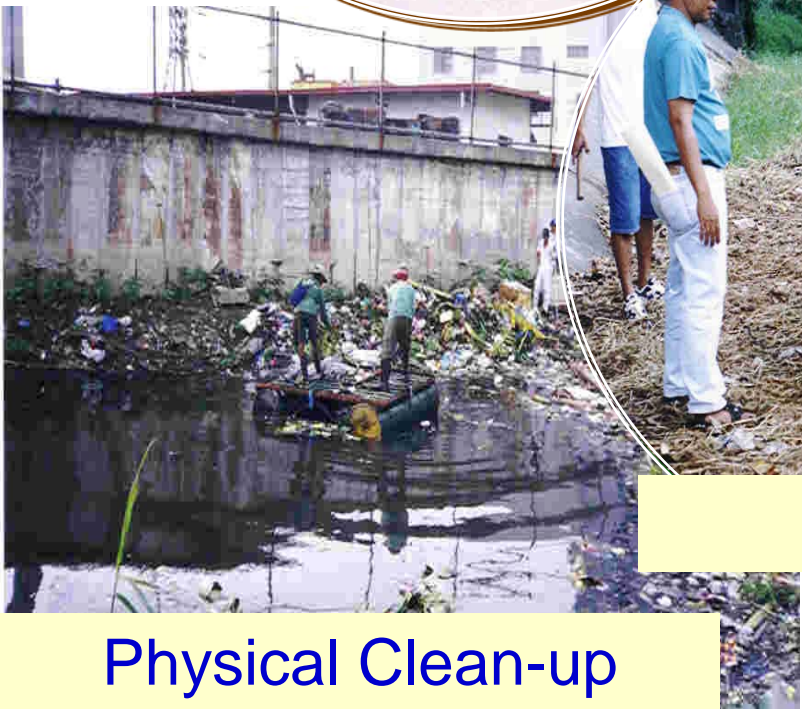
Continuing Partnership with the Private Sector and Support to the River Councils



River Councils



Environmental Army



Physical Clean-up



River Seeding

15 M

(5-yr Program)



Adopt a River

6. MATERIALS RECOVERY FACILITY & SANITARY LANDFILL

Mission:

To actively engage LGUs and local communities to scale up the implementation of solid waste management programs in the Laguna de Bay basin.



6. Material Recovery Facility and Sanitary Landfill

Project

- Construction of two (2) model sanitary landfills - P 300M



7. LAKE BASIN TRANSPORT SYSTEM & ECO-TOURISM

Mission:

To establish a reliable and affordable Lake basin transport system to catalyze economic growth and boost eco-tourism in the Laguna de Bay basin.



Entrance to El Pueblo Salvador Nature Park in Cavinti, Laguna



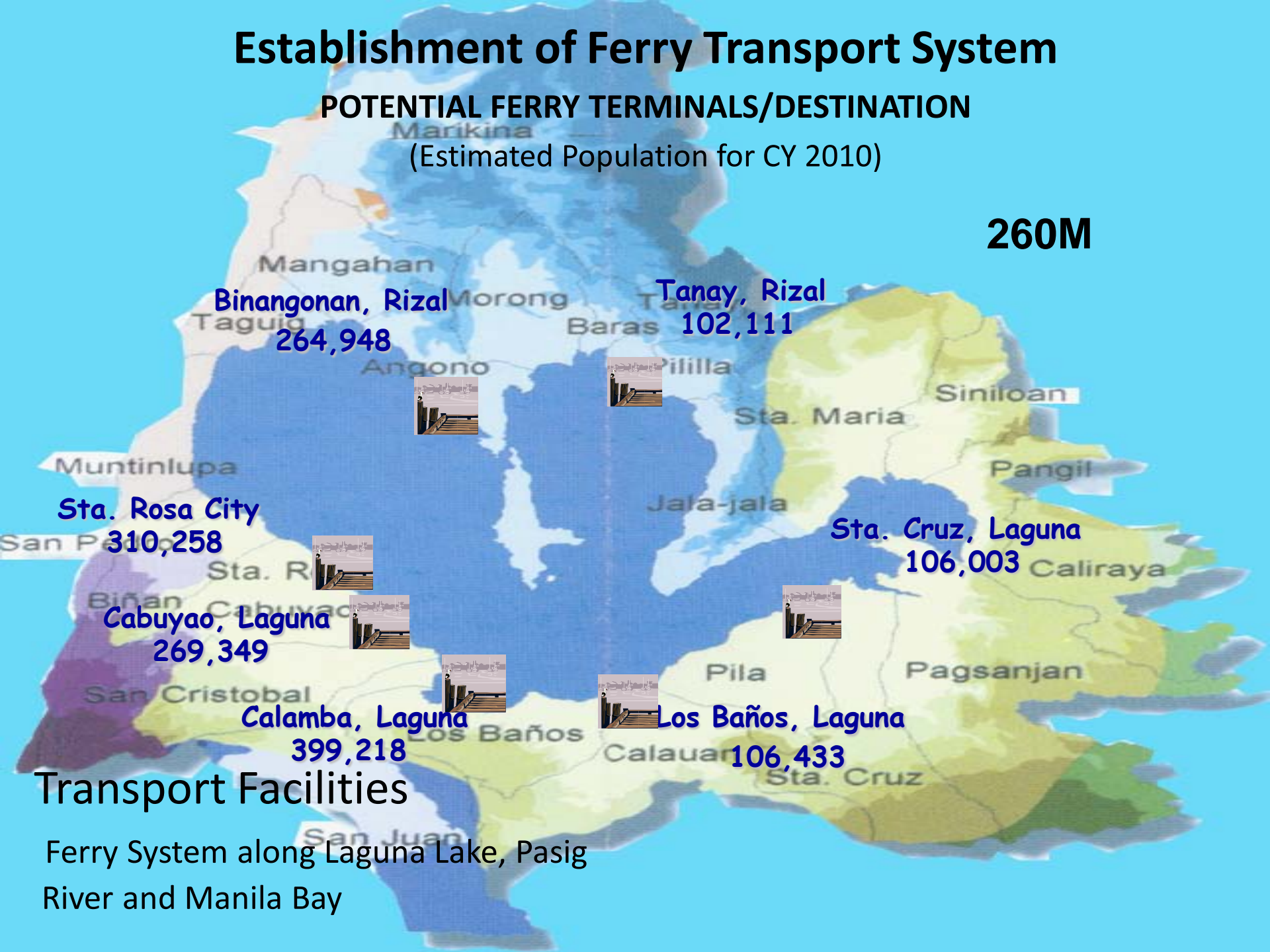
Entrance to El Pueblo Salvador Nature Park :
An attraction to among hikers

Establishment of Ferry Transport System

POTENTIAL FERRY TERMINALS/DESTINATION

(Estimated Population for CY 2010)

260M



Transport Facilities

Ferry System along Laguna Lake, Pasig River and Manila Bay

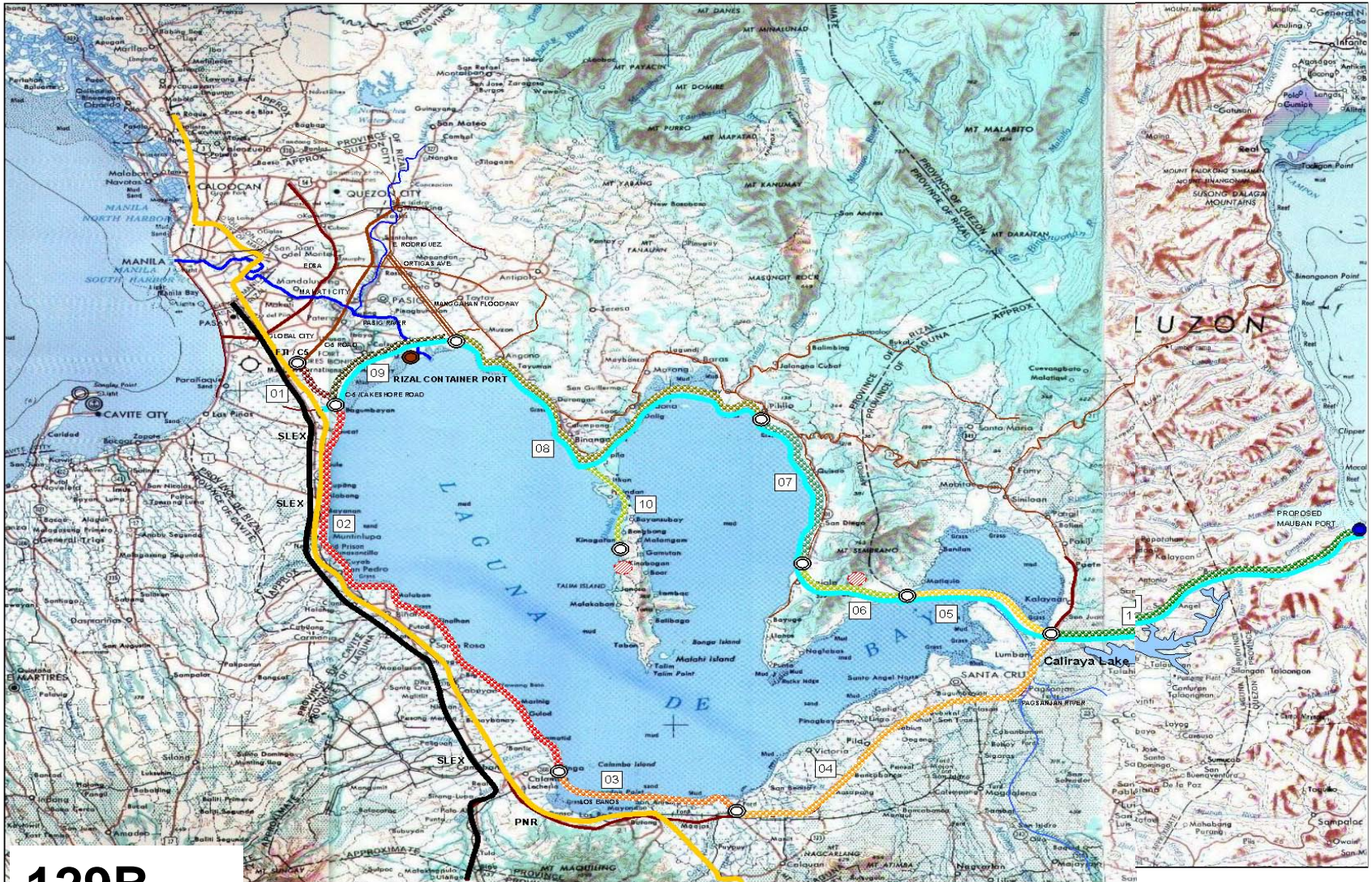
Construction of Circumferential Road



30B



LABART DEVELOPMENT PLAN



129B

Development of Ecotourism Projects (including the Seven Lakes of San Pablo City, Laguna)



Tadlac Lake



Construction of Rizal Shrine in Calamba City, Laguna



100M

8. INFORMATION, EDUCATION, COMMUNICATION CAMPAIGN

Mission:

To instill awareness and appreciation of the critical importance of Laguna de Bay among the stakeholders and to make them responsible stewards of the lake and its watershed.



Promote social acceptability and community involvement in the rehabilitation of Laguna Lake

PHP 50 M



Stakeholders Consultation

Stakeholder analysis

Production and distribution
of multimedia materials

Press relations

Community meetings and
town forums

Social networking
(facebook, twitter)

Assessment and evaluation

Establishment of Calauan Training Center



Other IEC Projects

- Conduct of seminars and workshops on project FS - P 5 M
- Conduct of seminars and workshops on institutional enhancement - 5 M



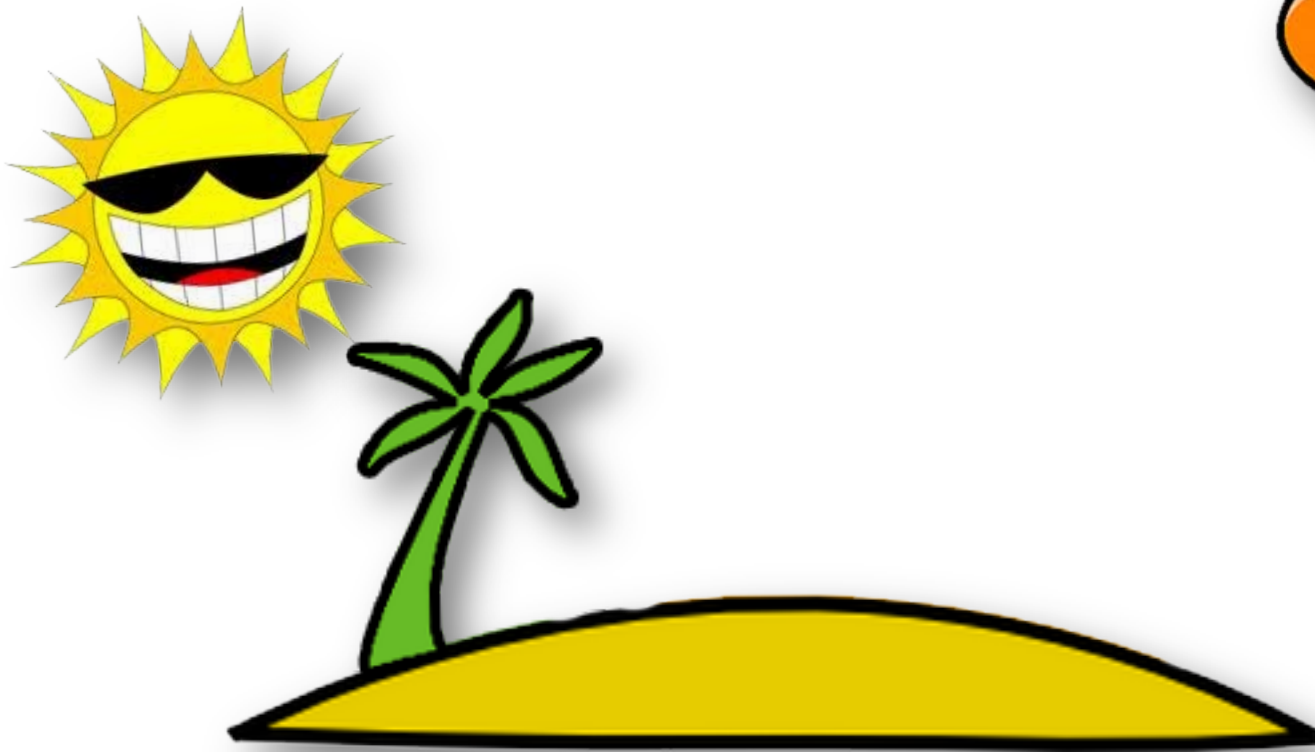
9. INSTITUTIONAL PARTNERSHIP

Mission:

To promote environmental-developmental public-private alliance and stakeholders' co-stewardship, employing the best possible approaches and practices in the conservation of the lake basin resources and in instilling inter-generational responsibility.

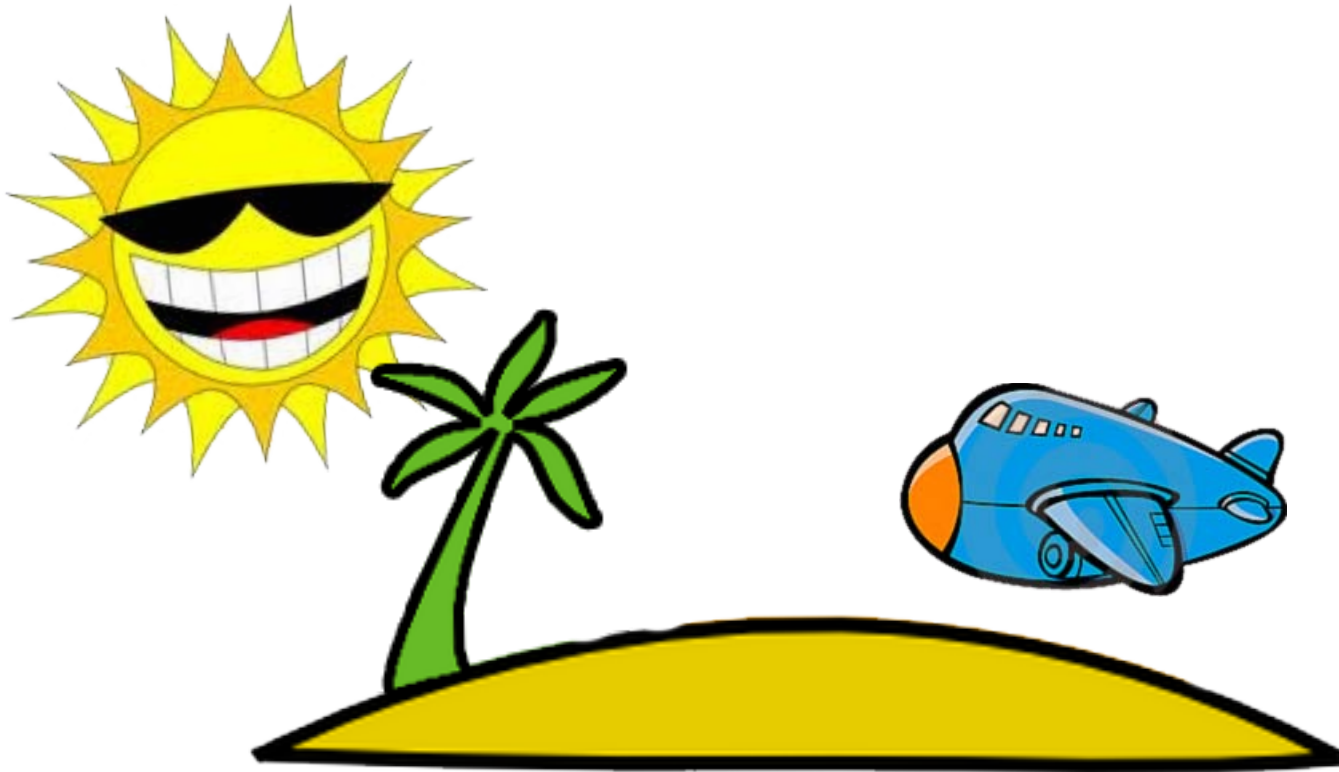


Proposed TALIM ISLAND AIRPORT



Proposed TALIM ISLAND AIRPORT

20B



10. WATER QUALITY

Mission:

To improve the water quality of the rivers and the Lake to sustain life and to support multiple beneficial uses.



10. Water Quality

Projects

- Conduct of Laguna de Bay
Monitoring - P 1.0 M
- Conduct of Lake Primary
Productivity Study - .5 M
- Conduct of Tributary Rivers
Monitoring - 3.5 M
- Conduct of Crater Lakes
Monitoring - 1.0 M
- Conduct of Sediment Quality
Monitoring - 2.0 M
- Conduct of Assessment of Toxic
Substances in Fish Tissue - 2.0 M

11. FISHERIES DEVELOPMENT

Mission:

To ensure sustainable and equitable use of lake fishery resources and implement both short and long-term measures to restore its previous natural abundance of multiple high-value fish species that once thrived in Laguna de Bay.



11. Fisheries Development

Projects (1/2)

- Setting up of Lake Resources Research and Management Institute (LARRMI), with Limnology and Training Center - P 15M
- Conduct fish stock assessment with measures to eradicate invasive species, e.g., janitor fish - P 5M
- Conduct fish dispersal program - 4M
- Support funding for the culture of native species - 6M

11. Fisheries Development

Projects (2/2)

- | | | |
|--|---|-------|
| • Put up in-lake fish breeding stations | - | P 10M |
| • Establish a livelihood center | - | 30M |
| • Establish a pilot culture facility for high-value aquatic plants | - | 3M |
| • Conduct freshwater mangrove reforestation | - | 5M |
| • Purchase of patrol boat | - | 20M |

12. LAKE DREDGING

Mission:

To deepen the 2.5-meter shallow lake to a more desirable depth through cost-effective and environmentally sound dredging techniques to increase its holding capacity for flood control and navigation as well as to improve lake water quality for various beneficial uses.



12. Lake Dredging

Project

- Dredging of Laguna de Bay - P 18.5 B



13. RENEWABLE ENERGY

Mission:

To promote and develop, in partnership with the Department of Energy and the private sector, the use of renewable energy (RE) in the region such as hydroelectric and solar power, wind, geothermal and biomass to lessen our dependence on fossil fuels and as a strategic response to climate change, thereby transforming the Laguna de Bay basin into a model for RE development in the country.



13. Renewable Energy

Project

- Construction of lighthouses
using solar energy - P 20 M
- Development of Potential
Hydro-electric, Wind energy
Power Sites - P 200 M
- Conduct of Research on Biomass
Technology for potential
power source - P 20M

RESEARCH AGENDA

In partnership with UPLBFI and other Research Institutions:

1. Ecological and socio-economic footprint of aquaculture both in Laguna de Bay and the crater lakes in San Pablo City
2. Determination of the optimum water level and volume to meet the various demands for the lake's environmental goods and services including the needs of the lake ecosystem.
3. Impacts of climate change on food and health security in the lake basin
4. Development of an early warning system for algal bloom and fishkill
5. Revisiting the 12.5m elevation as basis in determining shoreland areas in light of squatters problem and development proposals covering the shoreland, including titling thereof.

RESEARCH AGENDA – con't

6. Polder Island and Green Island development
7. Feasibility on the Construction of an international airport in Talim Island
8. The socio-economic and environmental impact and implications of dredging the lake and its major tributaries
9. Determining the carrying capacity of the lake for aquaculture activities
10. Study on the impacts of snail dredging on the ecosystem

RESEARCH AGENDA – con't

11. Study on the determination of the BOD loading generated from aquaculture structures including loading from caretakers of fishpens/fishcages
12. Study on the impacts of climate change on aquaculture
13. Validation of the presence of traces of heavy metals on fish
14. Study on the ecological, socio-economical and political impact of the total phase out of fishpens and fishcages

RESEARCH AGENDA – con't

15. Fish stock assessment

16. Lake bathymetry and sedimentation patterns in Laguna de Bay

17. Total pollution load management system (TPLMS) in the Laguna de Bay region

18. Impact assessment of Ornamental Fish in Laguna de Bay and Crater Lakes

19. Fish diseases monitoring

20. Analysis of Toxic Substances in Kangkong

21. Biological control of water hyacinth

NEXT STEPS

- Preparation of spatial plan presenting the conceptual designs of the major infrastructure development projects under the Master Plan Framework for approval of President Benigno S. Aquino III in May 2011.
- Formulation of Terms of Reference for specific priority projects to address the various concerns as enumerated above and from there prepare proposals under the PPP set-up. The goal is to put in place certain flagship projects in the short term period and get them done by 2016 as much as possible.

Thank You