The Laguna de Bay and Its Tributaries

Water Quality
Problems. Issues and Responses

By

Dolora N. Nepomuceno

Laguna Lake Development Authority

Presented

at

The Second General Meeting

Of the

Network of Asian River Basin Organizations

15 February 2005

Outline

- Revisiting Laguna de Bay Basin
- Water Quality Situationer
- Addressing key issues/challenges

  - Regulatory tools and market-based instruments

  - Public Disclosure

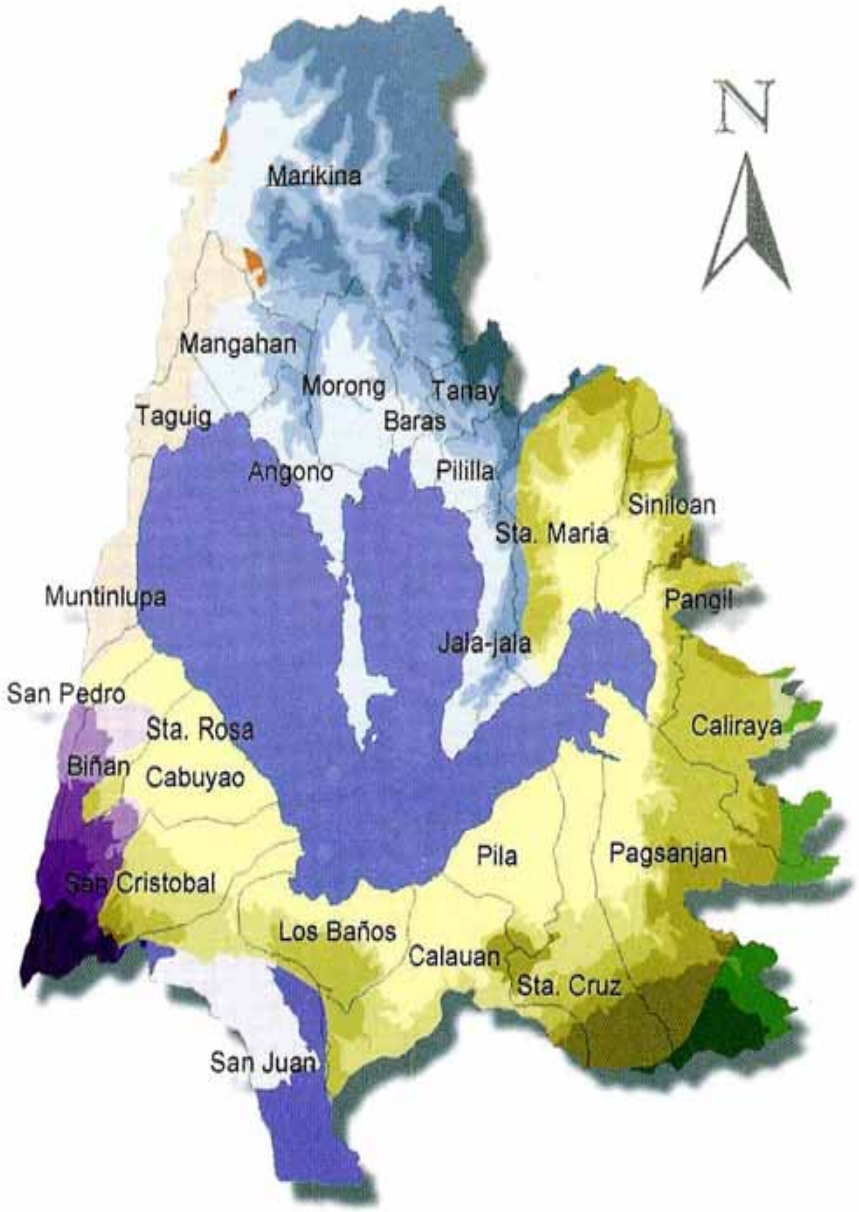
  - LISCOP Project

  - Laguna de Bay Community Carbon Finance Project
- Key Messages

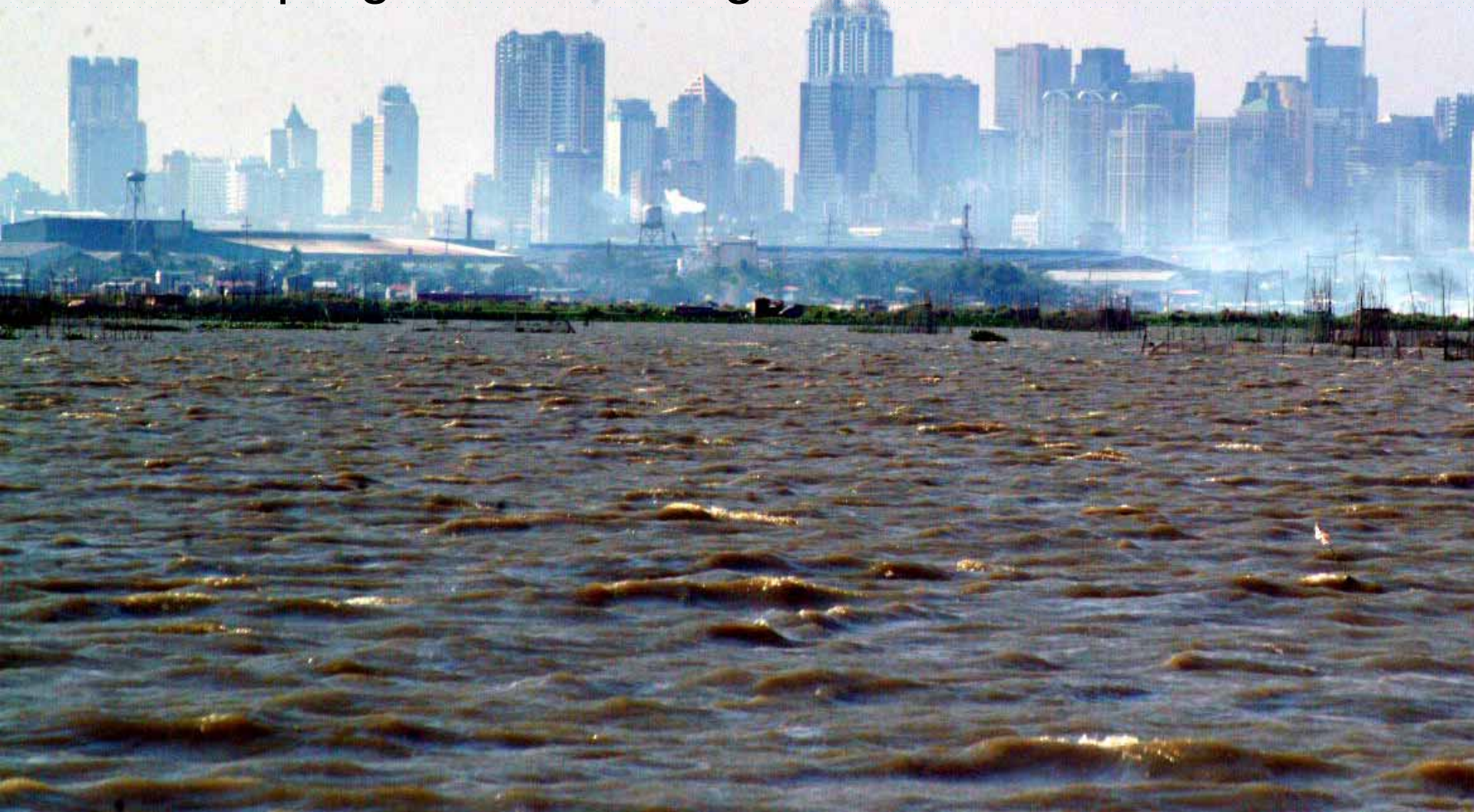
QUICK FACTS

Lake Surface Area:	*** 900 km^2**
Lake Average Depth:	**~ 2.5 m**
Lake Maximum Depth:	**~ 20m (Diablo Pass)**
Lake Average Volume:	**2,250,000,000 m^3**
Retention Time:	**~ 8 months**
Watershed Area:	*** 2,920 km^2**
Shoreline:	*** 285 km**
Watershed Population:	**~ 12 M (NSO 2000)**
Biological Resources:	**fish, mollusks, plankton macrophytes**

(* At 10.5m Lake Elevation)



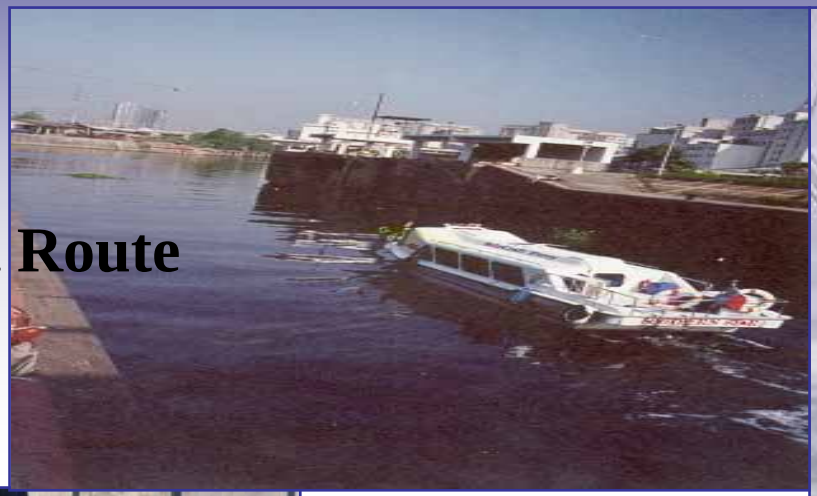
Laguna de Bay is a strategic political, economic and ecological resource that has to be managed well as a Living Lake, capable of sustaining life, livelihood and economic progress in the region and its environs.

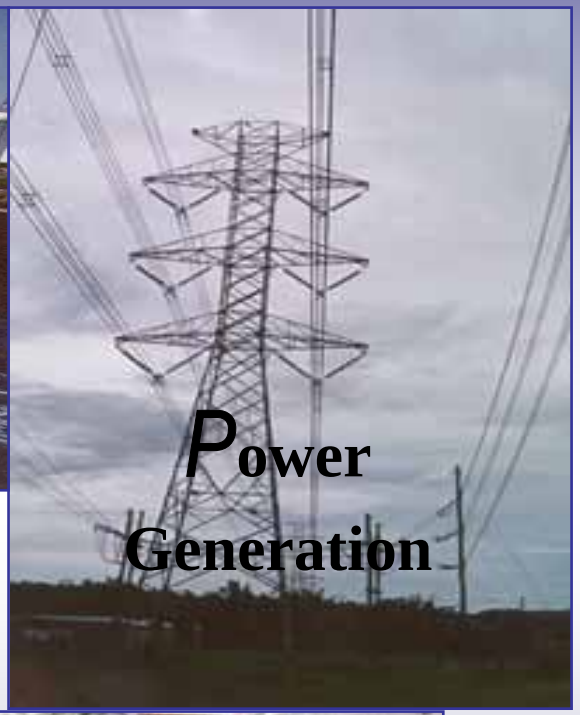


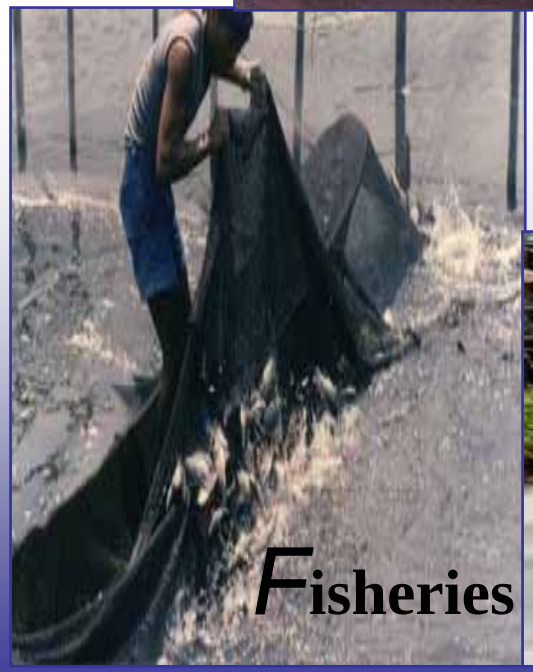
- The lake is life support system to about 12 million people
- 3.05 million of these live along the lakeshore

It is the major source of freshwater fish in the surrounding provinces, municipalities, and cities.

Existing Lake Uses







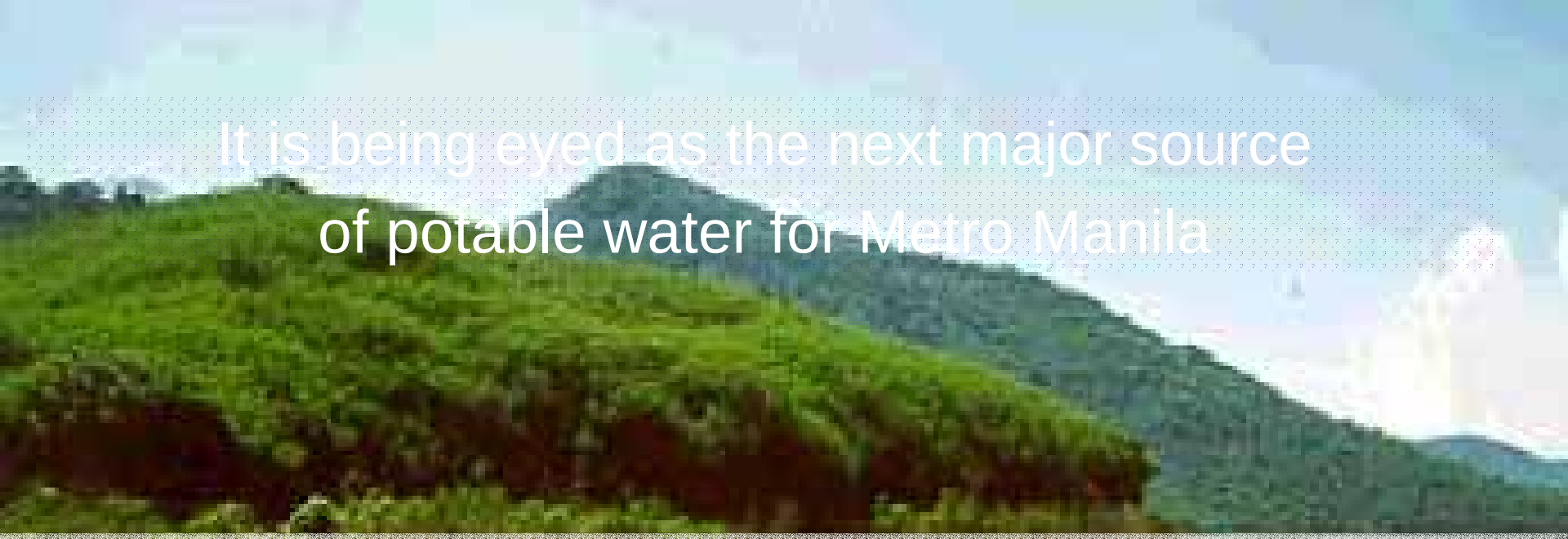
Existing Lake Uses

Irrigation

Recreation

Water Supply

Industrial Cooling



It is being eyed as the next major source of potable water for Metro Manila

More than 400,000 people in Metro Manila are already suffering from water shortage

A full blown water crisis is seen to hit Metro Manila in the near future

A private water company already draws approx. 300,000 m^3 of water per month

Economic development impacts threaten the Living Lake

Unprecedented economic growth over last 30 years -

Rapidly expanding industrialization and urbanization in the region

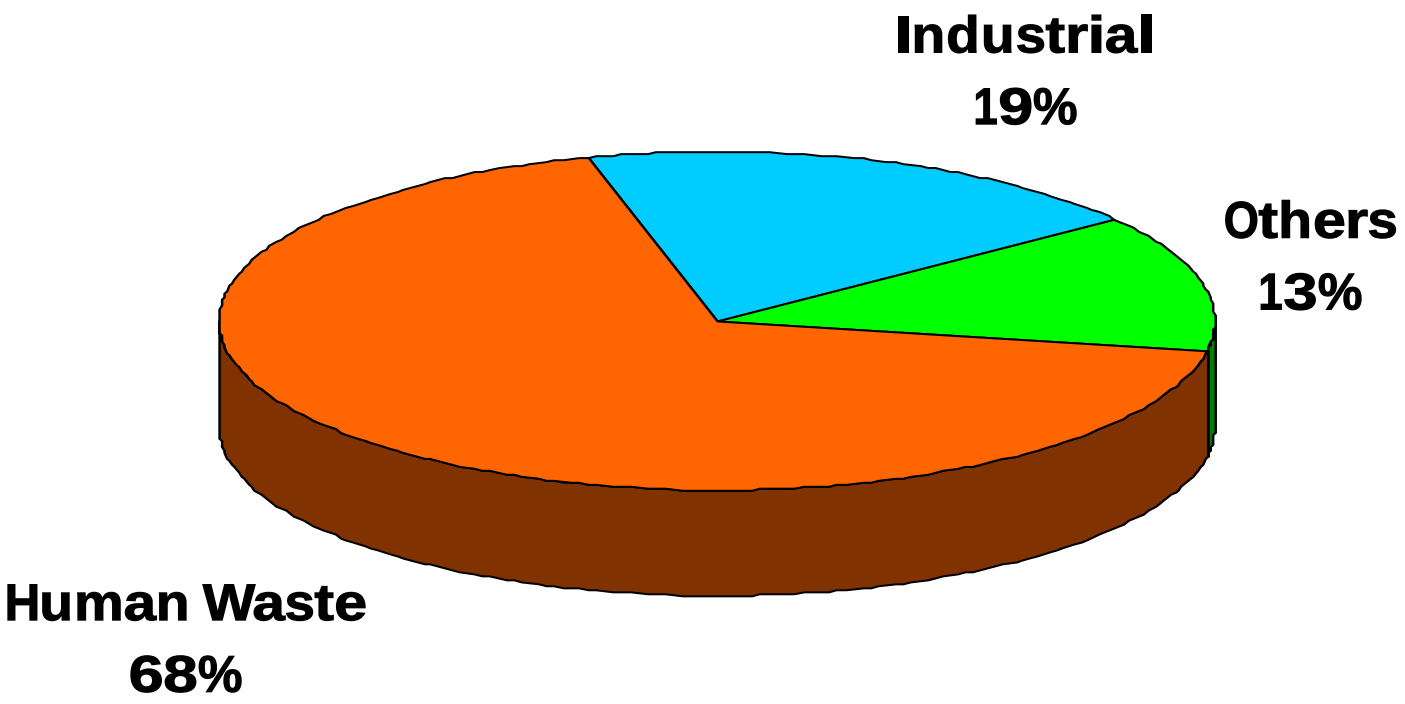
Conflicts existing among users/uses or the zoning priorities and jurisdictions.

Excessive discharge of pollutants from industries ...

... from communities

A THREATENED LAKE ECOSYSTEM

Organic Waste Profile in the Lake



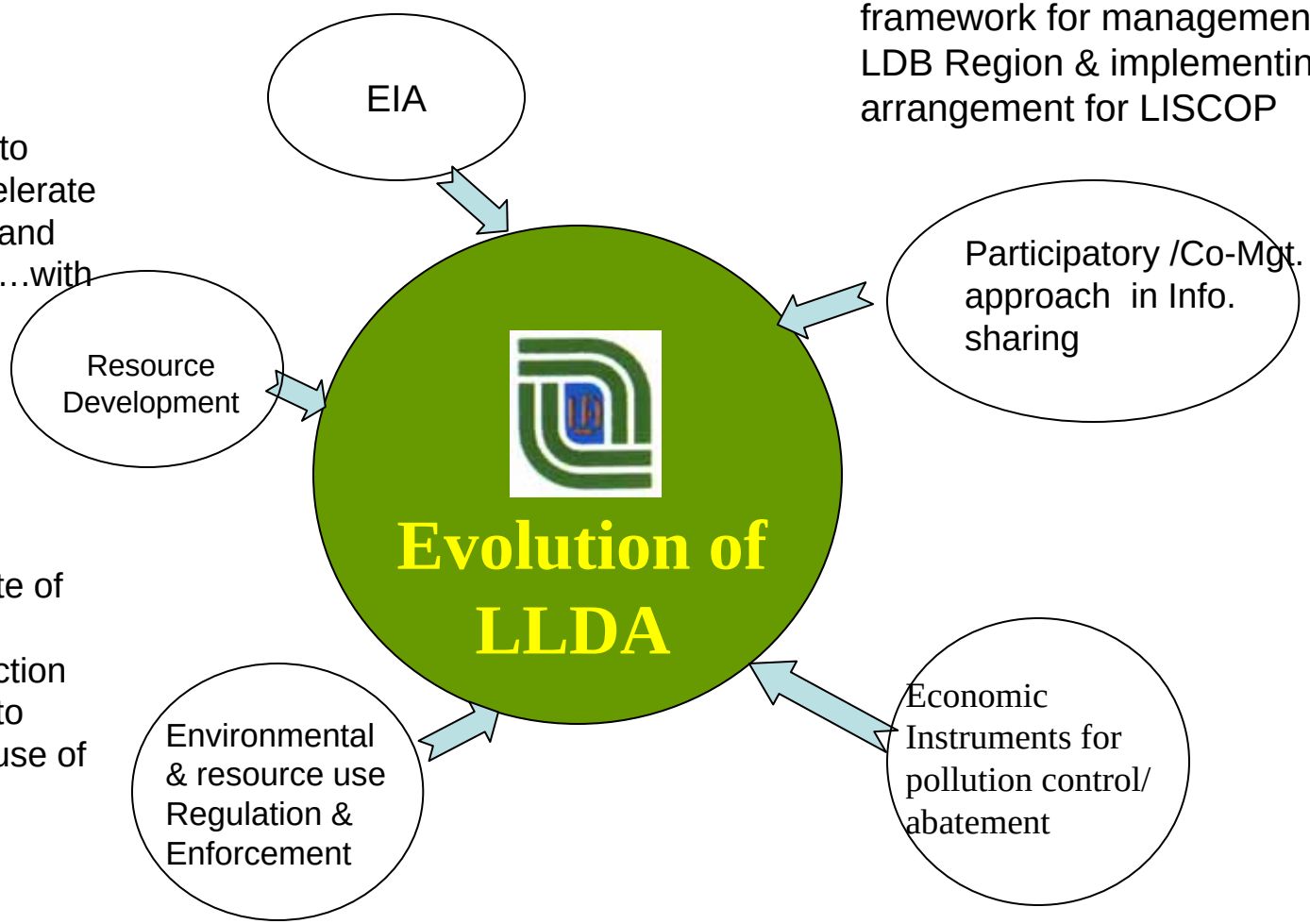
Social and Environmental costs

- Health and sanitation problems
- Threats to food security
- Loss of livelihood/income
- Threats to water security

DAO 2004-61 transfers authority to issue ECC/CNC to LLDA

LIDO / IMOA (2003) provides longer-term policy & institutional framework for management of LDB Region & implementing arrangement for LISCOP

RA 4850 (1966)
mandates LLDA .to promote and accelerate the development and balanced growth….with due regard for environmental management….)



PD 813 (1975)
Expands the mandate of LLDA to address environmental protection including the power to issue permit for the use of surface waters

EO 927 (1983)
Classified LLDA as Class A Corporation
Authorized to modify its organization
Granted water rights over Laguna de Bay and other water bodies within the region
Granted power to control and abate pollution within the region
Authorized to collect fees for the use of lake water

BR 33 (1996)
Approval of EUFS & adoption of IRR implementation started 1997

Philippine Clean Water Act
R.A. 9275

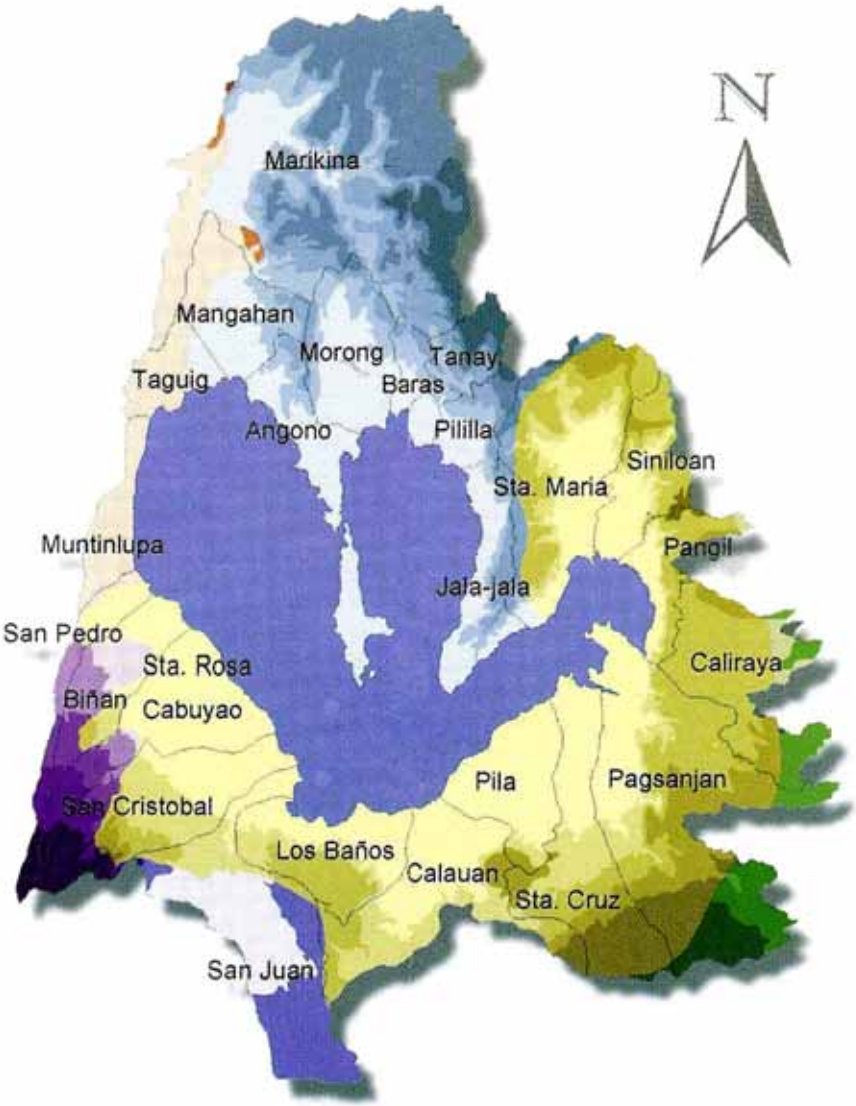
Establishment of WQMAs

- LGUs with similar geographical, meteorological conditions, etc., or
- LGUs which share common interest or face similar dev't. prog./problems
- Governed by a governing board:
  - composed of reps. of mayors, governors, relevant natl. govt. agencies, civil society, water utility & business sector

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		

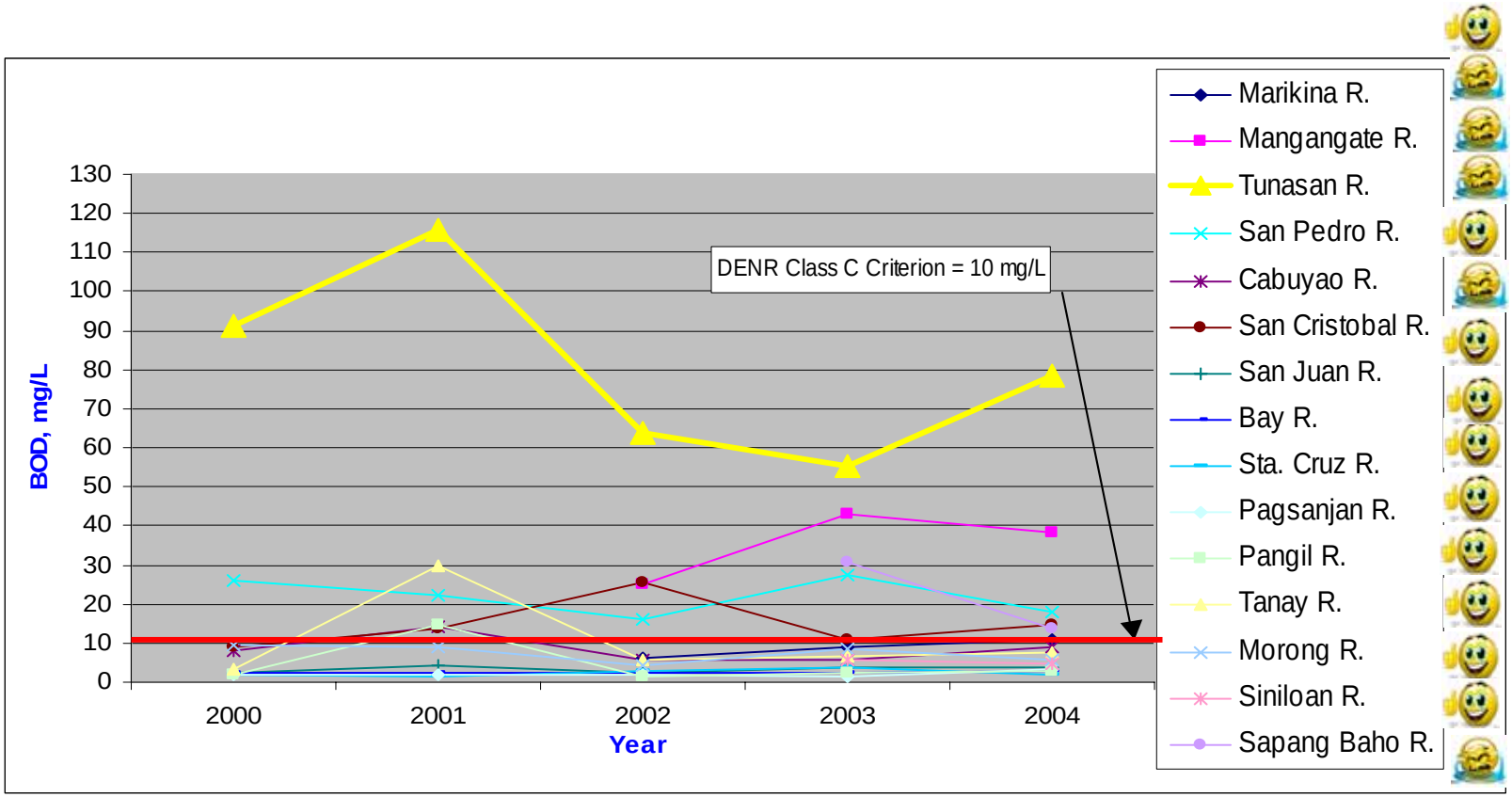
Total no. of cities	**=**	**14**
Lakeshore municipalities	**=**	**25**
Non-lakeshore municipalities	**=**	**22**
Total no. of barangays	**=**	**2,656**



Water Quality of the River Systems

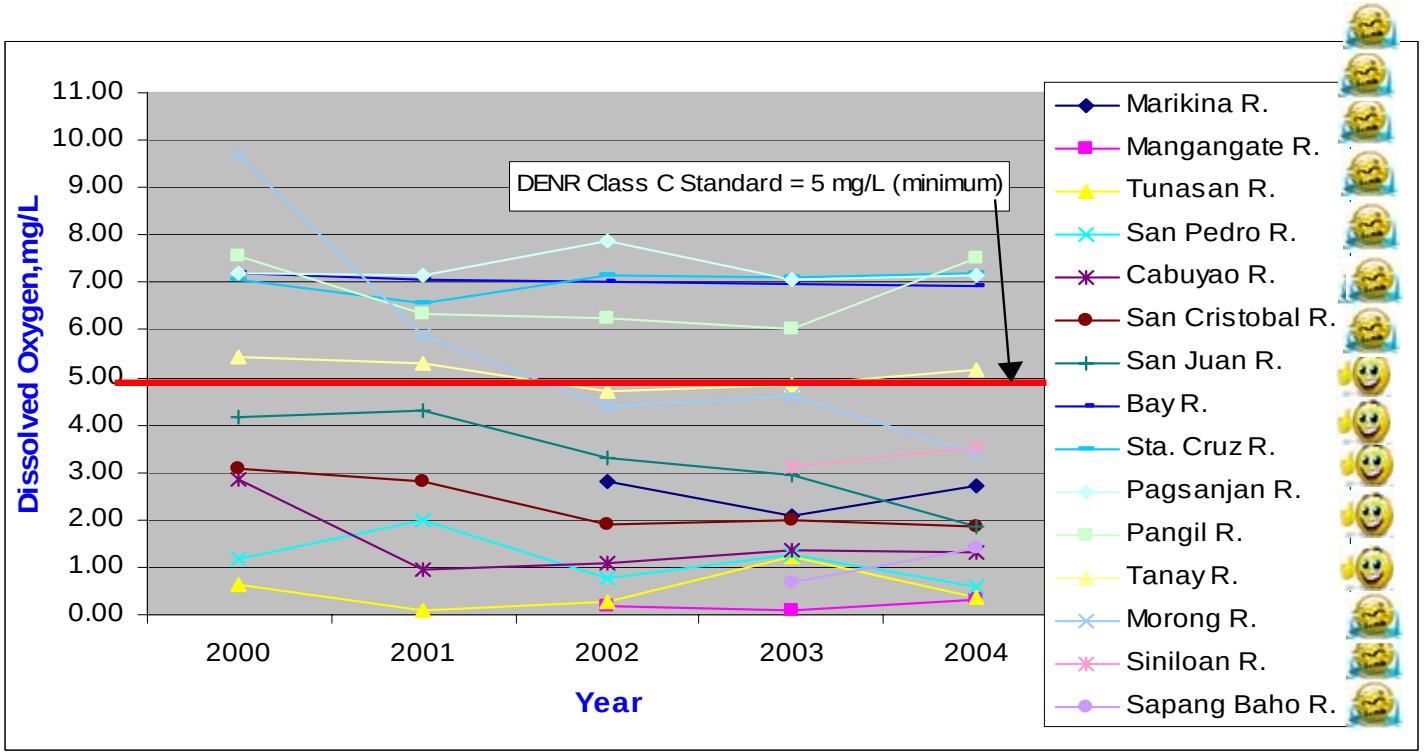
Biological Oxygen Demand Levels

BOD concentration in the 15 rivers, 2000-2004



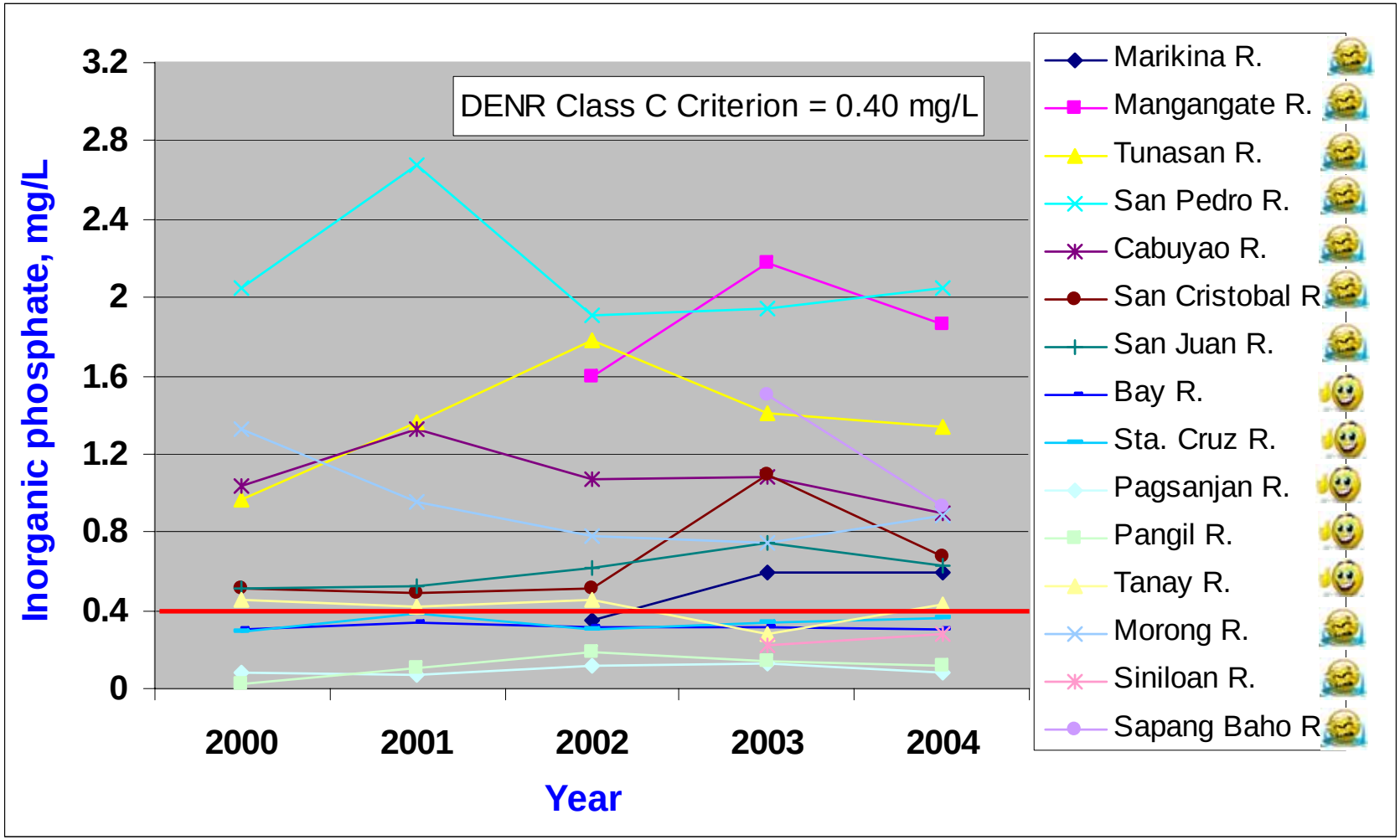
Dissolved Oxygen Levels

Percent DO saturation in the 15 rivers, 2000-2004



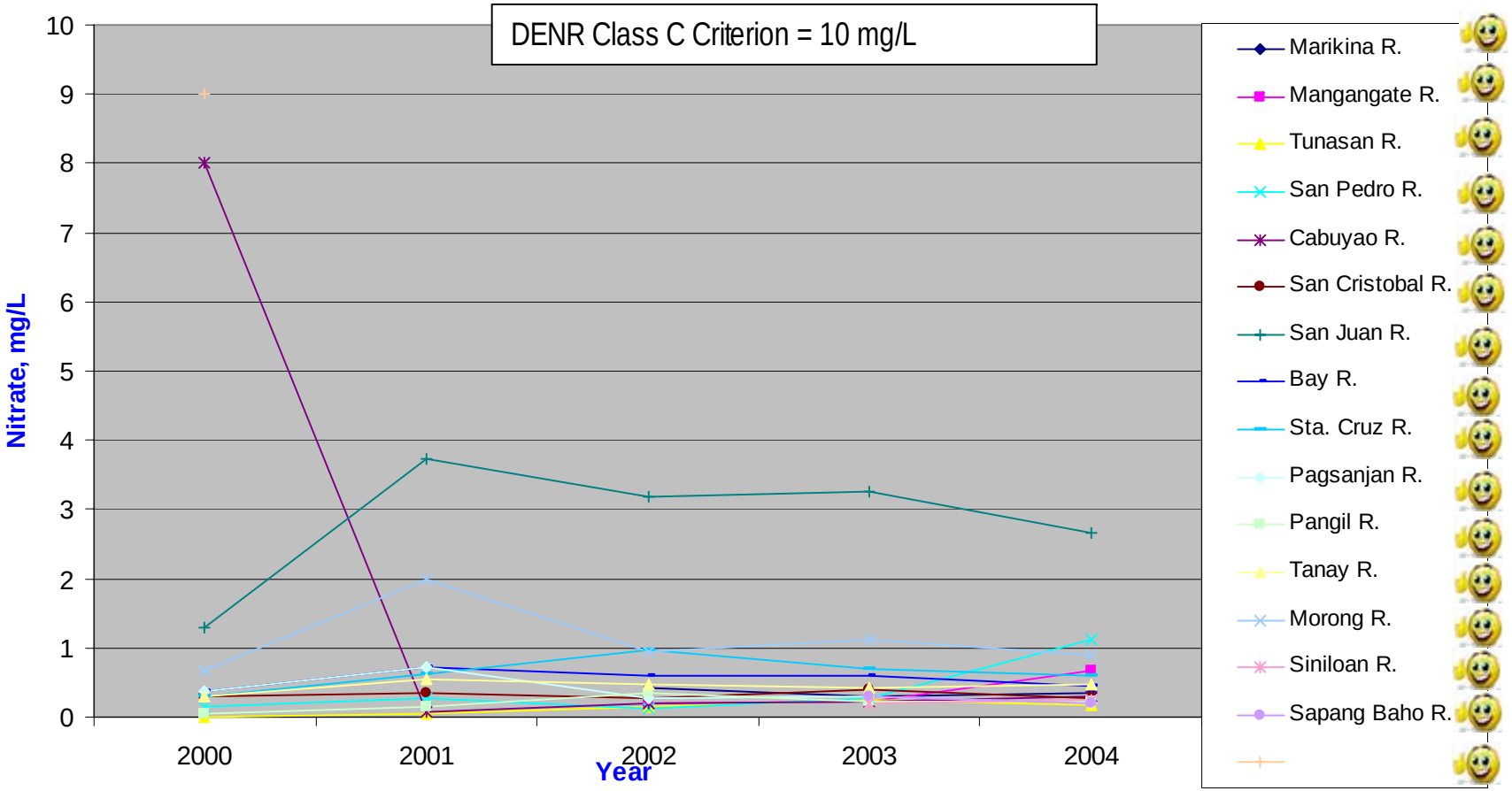
Phosphate Concentrations

Phosphate concentration in the 15 rivers, 2000-2004



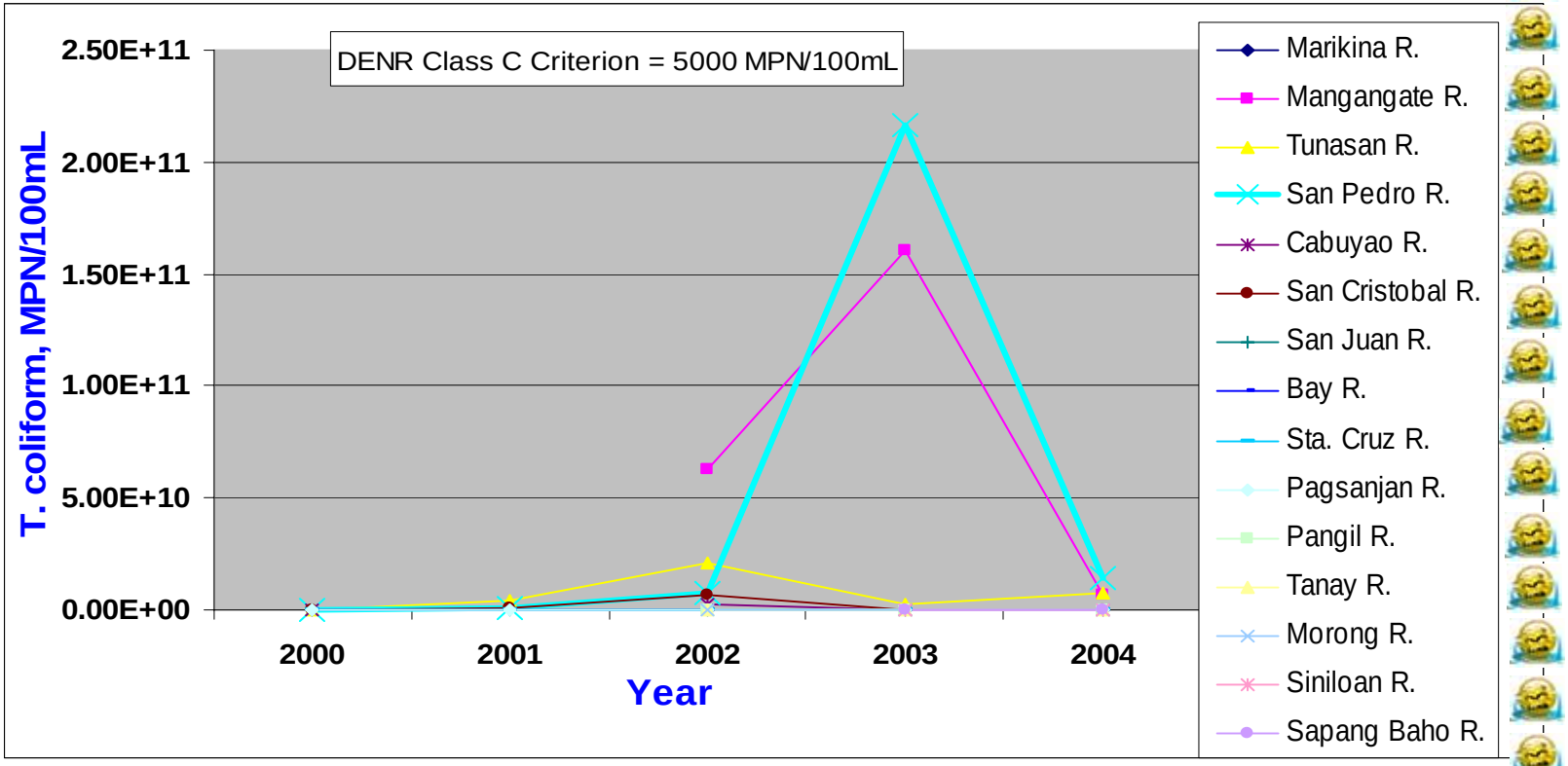
Nitrate Concentrations

Nitrate concentration in the 15 rivers, 2000-2004



Total Coliforms

Geometric mean of total coliform counts in the 15 rivers, 2000-2004



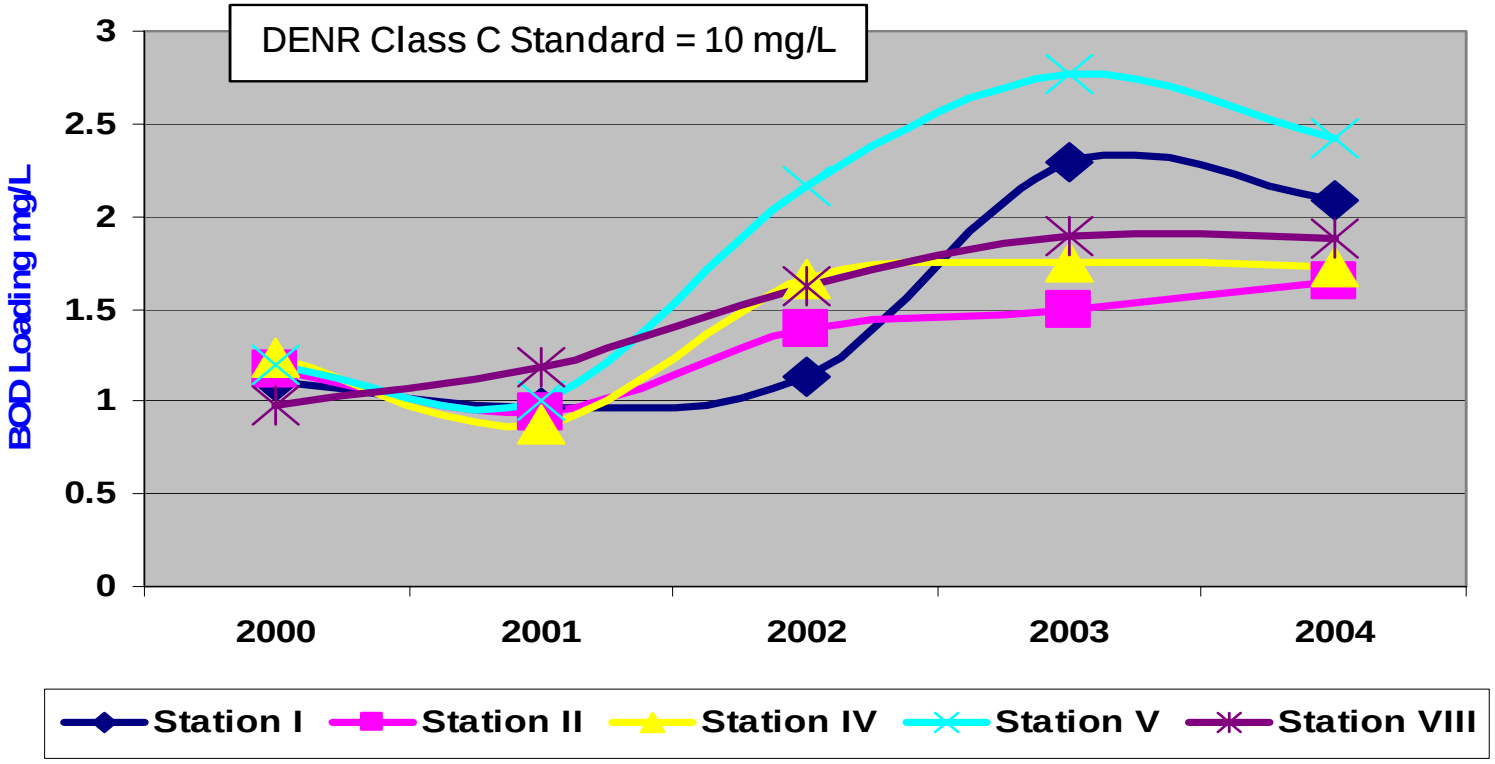
Summary

	BOD	DO	Phosphate	Nitrate	Total Coliform
Marikina River	👍	😂	😂	👍	😂
Mangangate River	😂	😂	😂	👍	😂
Tunasan River	😂	😂	😂	👍	😂
Sn Pedro River	😂	😂	😂	👍	😂
Cabuyao River	👍	😂	😂	👍	😂
Sn Cristobal River	😂	😂	😂	👍	😂
San Juan River	👍	😂	😂	👍	😂
BaY River	👍	👍	👍	👍	😂
Sta. Cruz River	👍	👍	👍	👍	😂
Pagsajan River	👍	👍	👍	👍	😂
Pangil River	👍	👍	👍	👍	😂
Tanay River	👍	👍	👍	👍	😂
Morong River	👍	😂	😂	👍	😂
Siniloan River	👍	😂	😂	👍	😂
Sapang Baho River	😂	😂	😂	👍	😂

Water Quality of the Lake

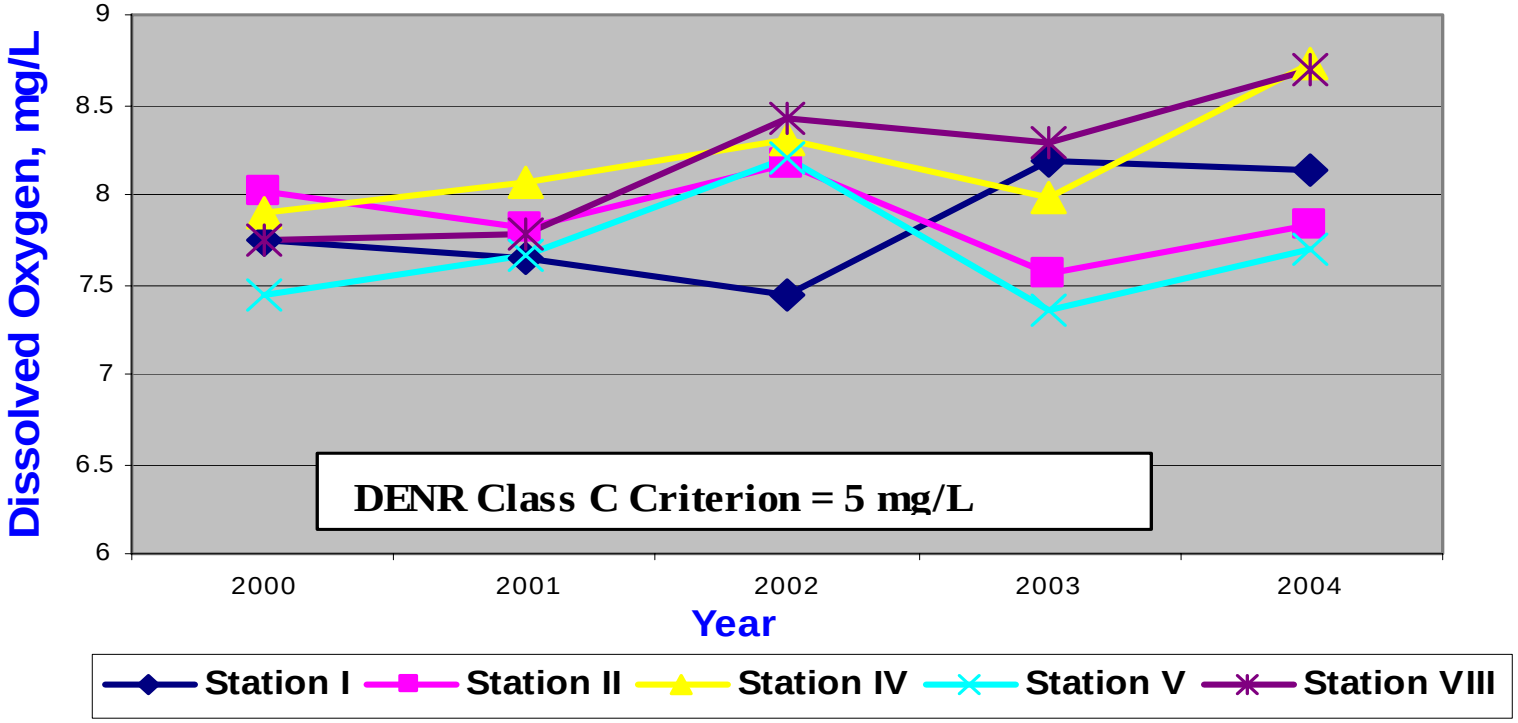
Biological Oxygen Demand Levels

BOD concentration in the five monitoring lake stations, 2000-2004



Dissolved Oxygen Levels

DO level in the five monitoring stations, 2000-2004



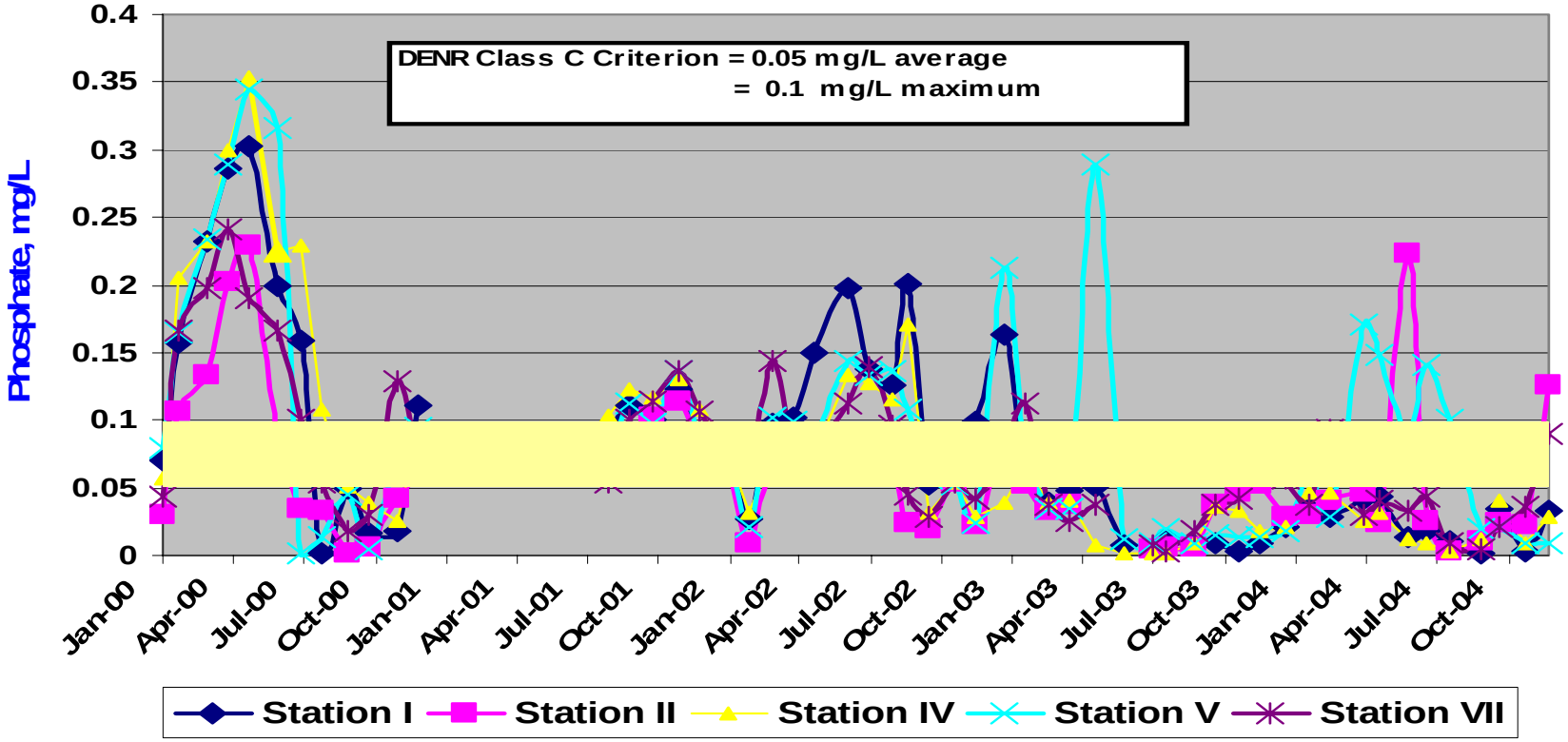
Algal bloom

<u>Oxygen depletion due to algal bloom</u>

The algae or “liya” produce dissolved oxygen through photosynthesis, but they utilize the dissolved oxygen when they respire and decompose, which can be more than what they have produced. A deficit is created, and fish grasp for whatever oxygen is left eventually leading to fishkill.

Phosphate Concentrations

Phosphate concentration in the five monitoring stations, 2000-2004



Nitrate Concentration

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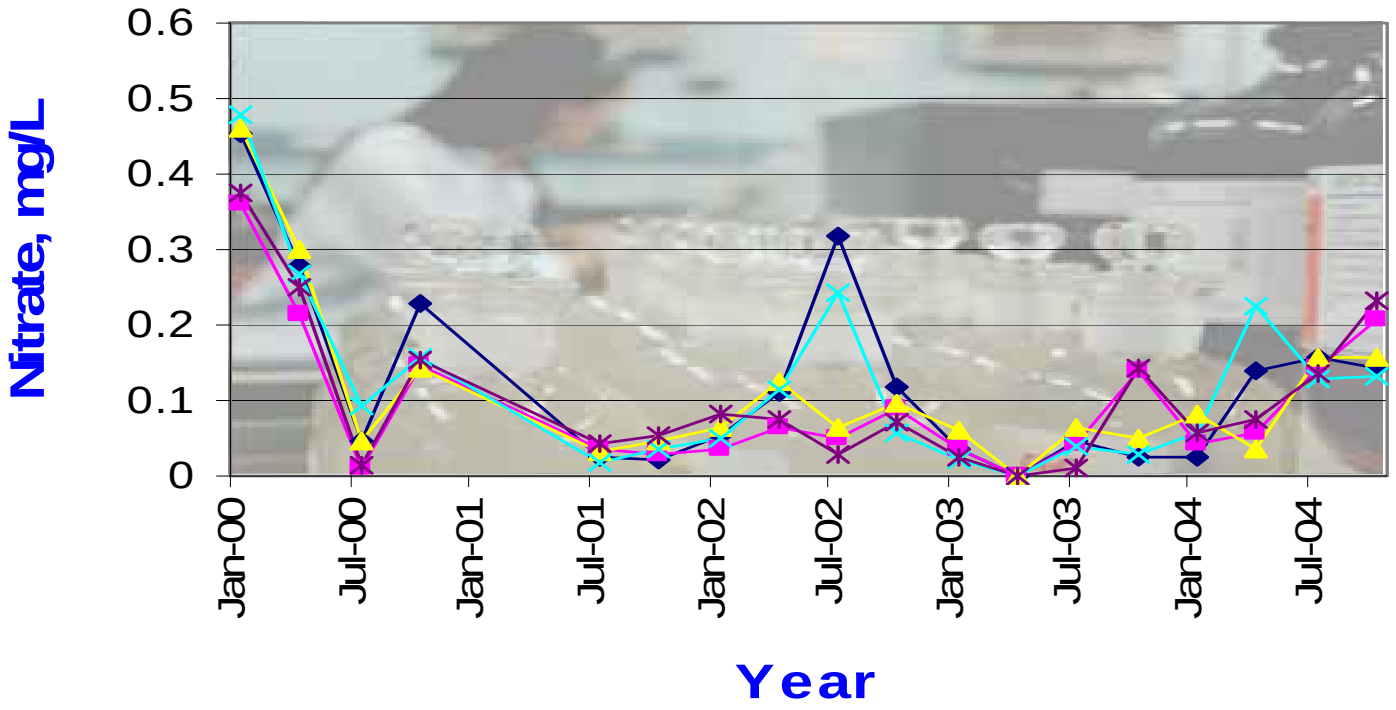
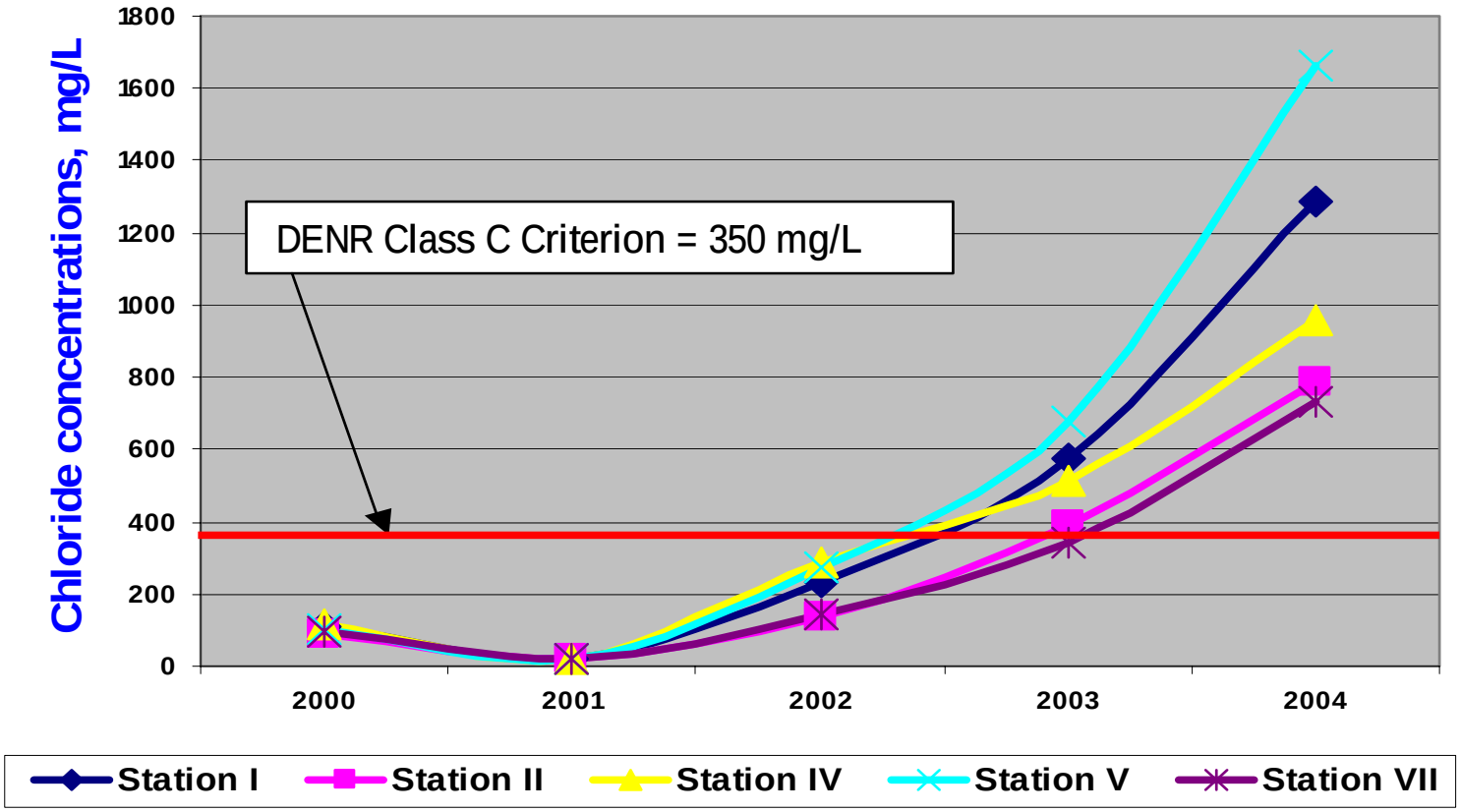


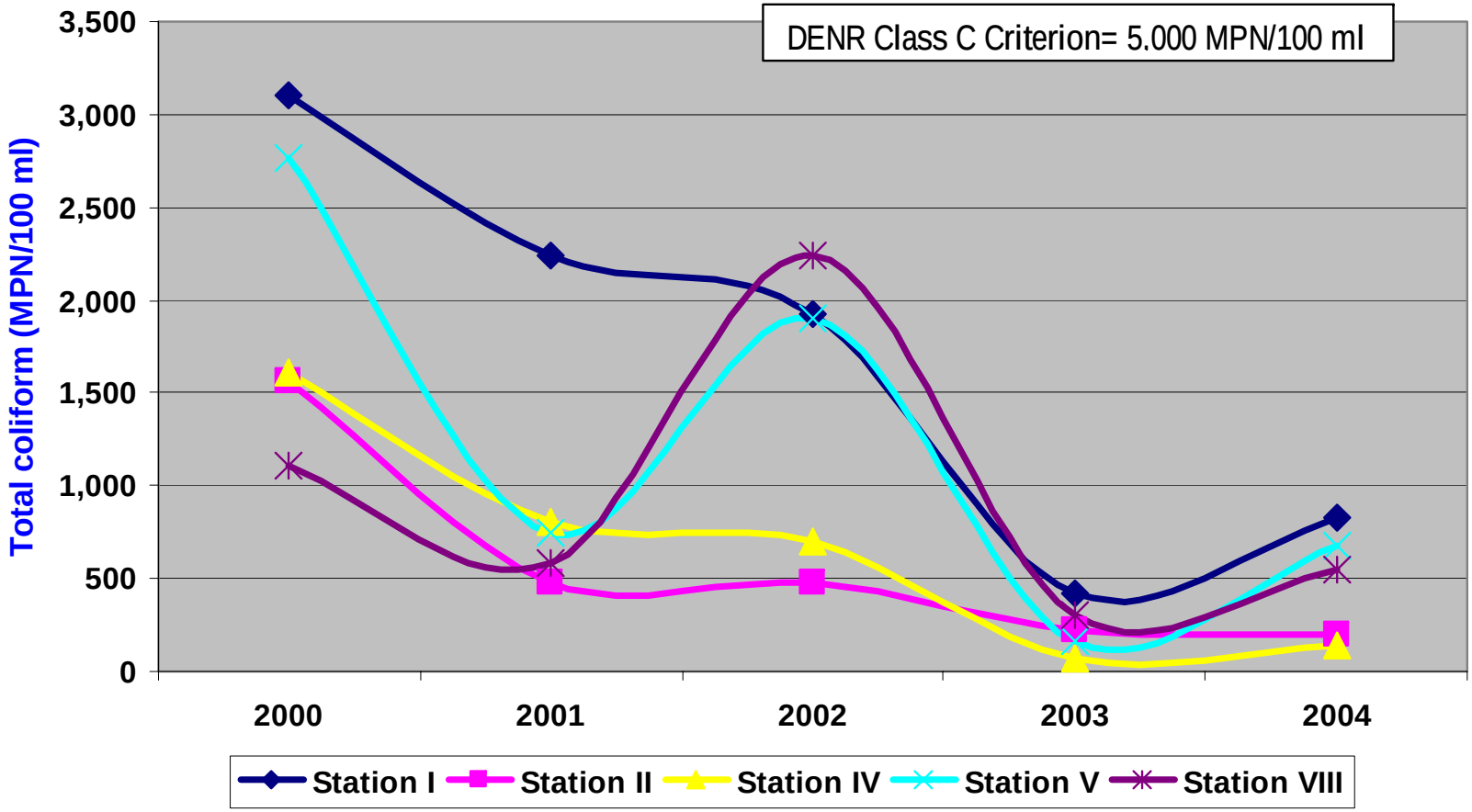
Chloride Concentration

Chloride concentration in the five monitoring stations, 2000-2004



Total Coliforms

Geometric mean of total coliform in the five monitoring stations, 2000-2004



Heavy Metals

Heavy Metals	Range of Concentrations, mg/L	Water Quality Criteria For Class C waters, mg/L
Chromium, hexivalent	0.0002-0.003	0.05
Cadmium	0.004	0.01
Lead	0.04-0.1	0.05
Copper	0.01-0.1	0.05
Iron	0.01-13.8	-
Nickel	0.01	-
Zinc	0.01-0.45	2

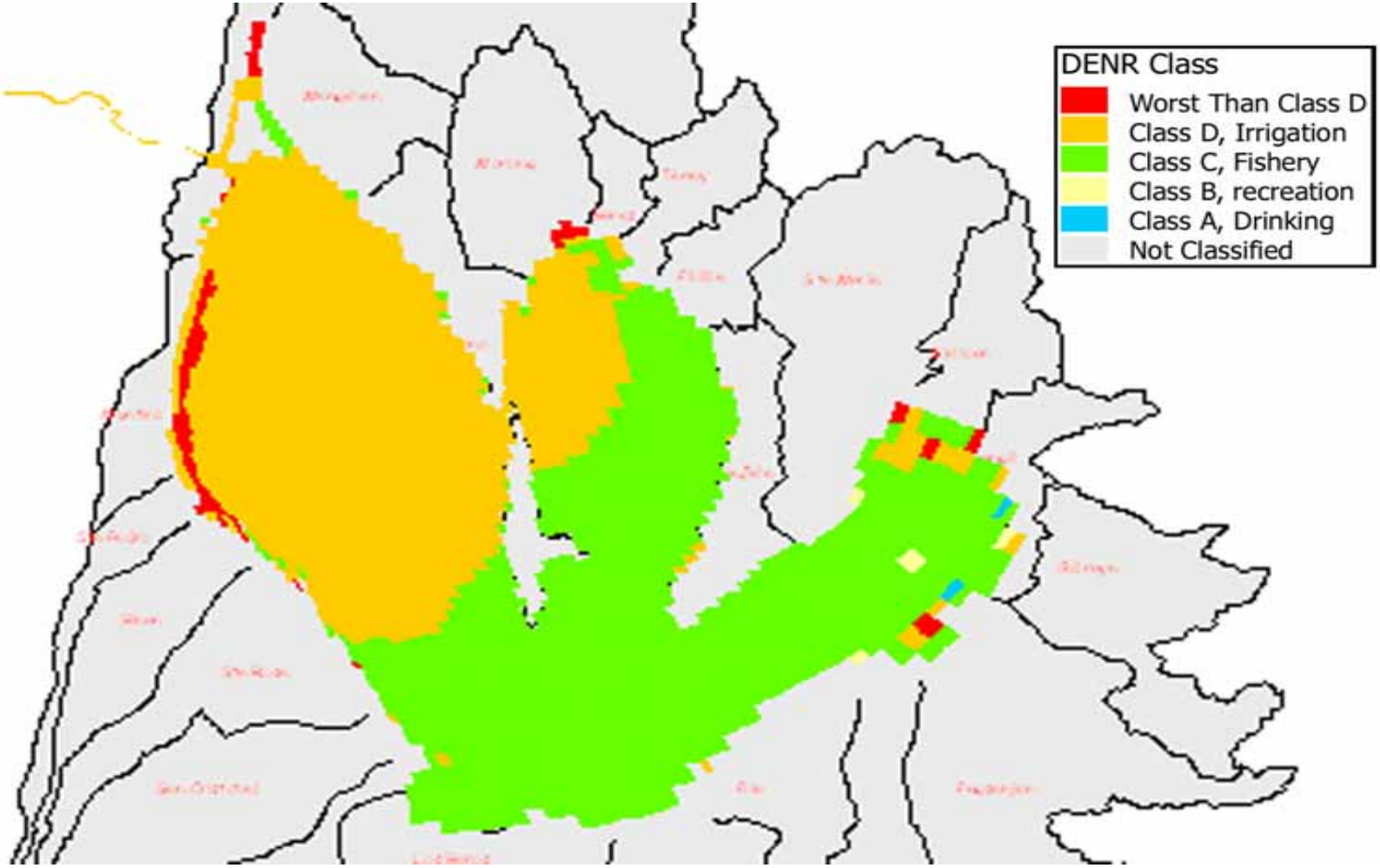
The Water Mondriaan

Location	Months											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Central West Bay	D	C	C	D	D	A	C	C	C	C	C	D
East Bay	D	D	C	C	D	D	A	C	B	D	C	worse than D
Central Bay	D	C	A	D	D	D	A	D	C	D	A	D
Northern West Bay	D	C	D	D	D	D	B	C	C	D	C	D
South Bay	C	D	C	D	C	D	A	C	C	D	C	D
Western West Bay – Taguig	No data	No data	C	No data	No data	D	A	A	No data	C	C	No data
Western West Bay - San Pedro	No data	No data	C	No data	No data	D	C	D	No data	D	C	No data
Western West Bay – Biñan	No data	No data	C	No data	No data	D	D	D	No data	D	C	No data
Western West Bay - Sta. Rosa	No data	No data	D	No data	No data	A	D	B	No data	C	A	No data
Marikina River	worse than D	worse than D	worse than D	D	worse than D	worse than D	worse than D	D	D	worse than D	worse than D	worse than D
Mangangate River	worse than D	worse than D	worse than D	worse than D	No data	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D
Tunasan River	worse than D	worse than D	No data	worse than D	No data	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D
San Pedro River	worse than D	worse than D	worse than D	worse than D	No data	worse than D	worse than D	D	worse than D	worse than D	worse than D	worse than D
Cabuyao River	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D	D	worse than D	worse than D	worse than D	worse than D
San Cristobal River	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D	D	worse than D	worse than D	worse than D	worse than D	worse than D
San Juan River	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D	D	worse than D	worse than D	worse than D	worse than D	worse than D
Bay River	D	D	D	D	D	D	D	D	D	D	D	D
Santa Cruz River	D	D	D	D	D	D	D	D	D	D	D	D
Pagsanjan River	worse than D	D	D	D	D	D	D	D	D	D	D	D
Pangil River	D	D	D	D	D	D	D	D	D	D	D	D
Siniloan River	worse than D	worse than D	worse than D	D	worse than D	worse than D	worse than D	D	worse than D	worse than D	D	D
Tanay River	worse than D	D	worse than D	D	worse than D	D	worse than D	D	D	D	D	D
Morong River	worse than D	D	D	D	worse than D	worse than D	worse than D	D	D	worse than D	worse than D	D
Sapang Baho River	worse than D	worse than D	worse than D	D	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D	worse than D

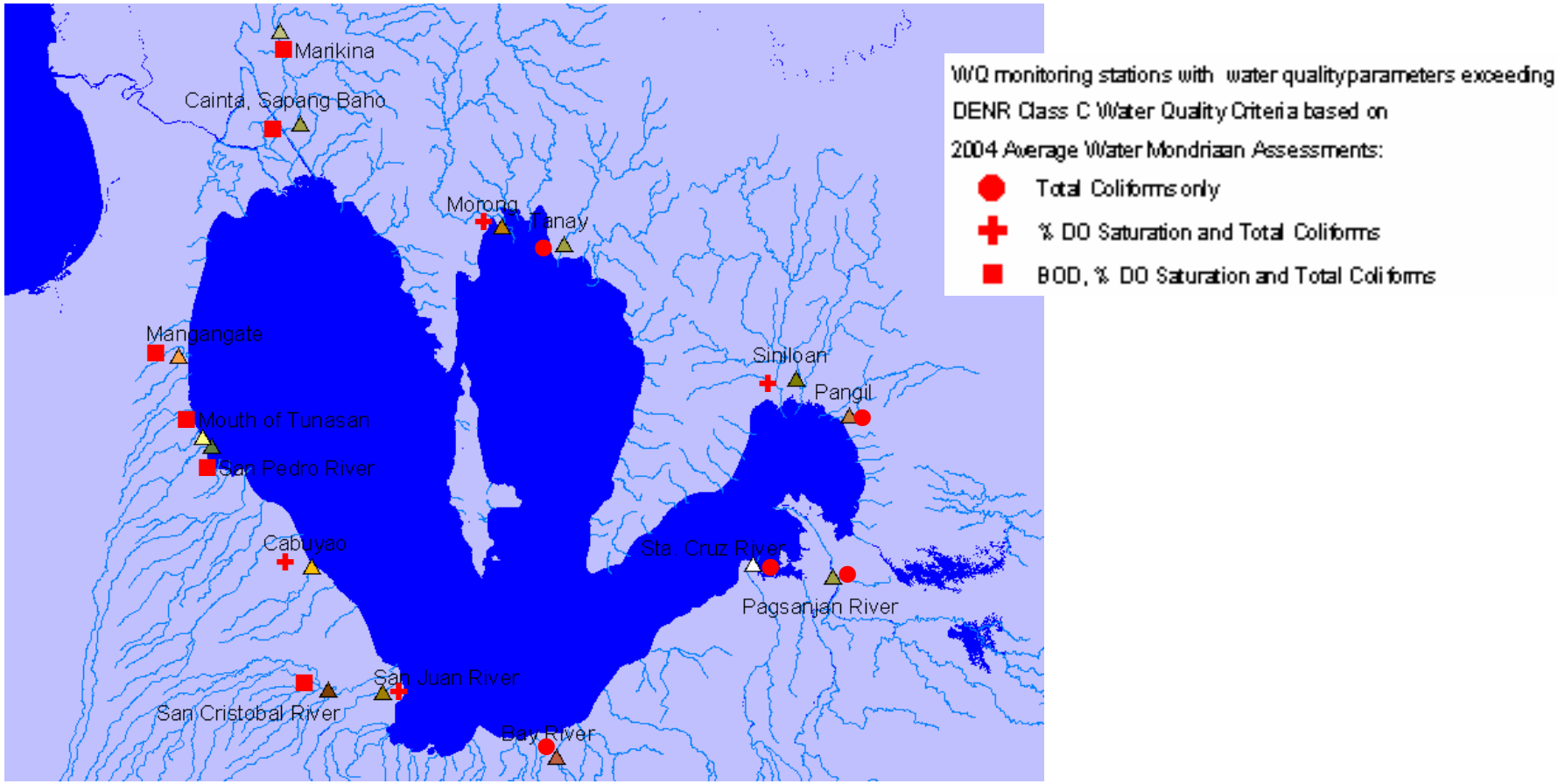
* The monthly Mondriaan assessment of water quality status was done by comparing the monthly LLDA's water quality monitoring results in identified lake and river monitoring stations to the DENR Water Quality Criteria for freshwater systems.

HOT SPOTS

Present Situation of the Lake



Critical Areas that need Intervention



What is LLDA doing?

LLDA's IWRM Approach

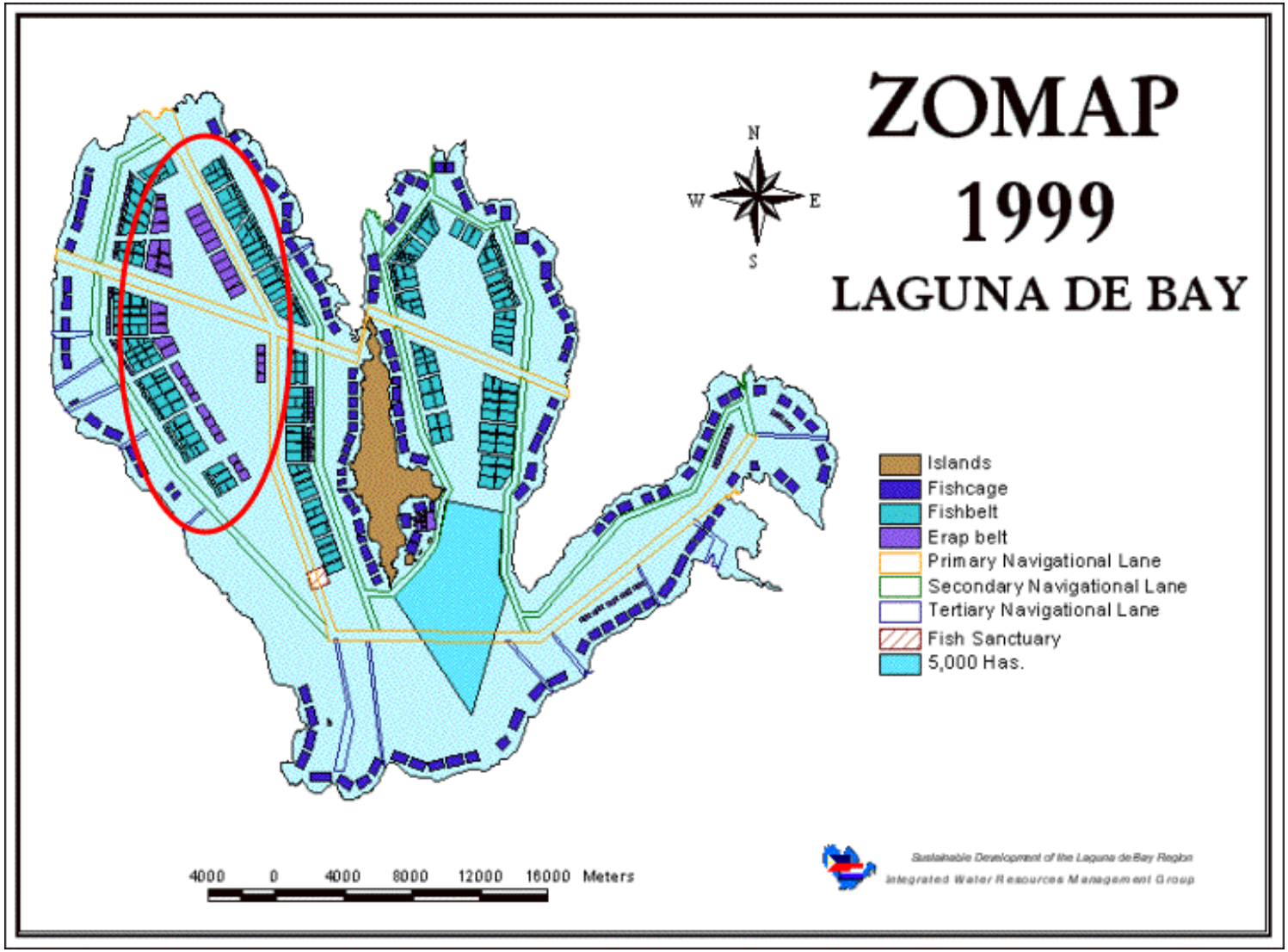
- Watershed-based: 24 micro-watersheds serve as the basic units for planning & implementing environmental improvement programs
- Integrated and participative in approach
- Transcends political, economic and social interests
- Supported by scientifically-based natural resources and environmental management programs built upon LLDA's extensive water quality monitoring data

Fishpen controversy

- *Problem*:Fierce competition for the lake fishery resources

- *Solution*: Zoning and Management Plan (ZOMAP) with a benefit sharing scheme from fishpen fees with Lakeshore LGUs

Fishery Zoning and Management Program



Threats to tributaries

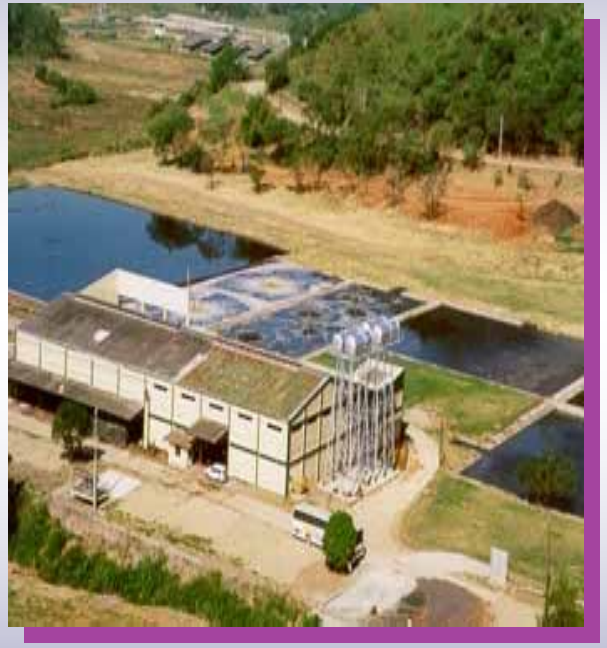
- *Problem*: Contamination from communities, industries and other sources, threatening an essential resource whose loss could lead to conflict
- *Solution:* River Rehabilitation Program
  - River Basin Councils/Foundations
  - Information, Education and Communication Program
  - "Environmental Army" (World's first)
  - Donor support

Environmental User Fee System

Reduction of pollution

=> water quality improvement

- **Provide incentives for dischargers**
- **Raise revenue for investment in water quality improvement**



Laguna de Bay Institutional Strengthening and Community Participation Project

Meeting the Challenges to the Sustainable Development of Laguna de Bay

Laguna de Bay Institutional Strengthening and Community Participation (LISCOP) Project

Goal : *Environmental Quality Improvement*

Objectives:

- Deepen watershed co-management
- Strengthen institutions and instruments

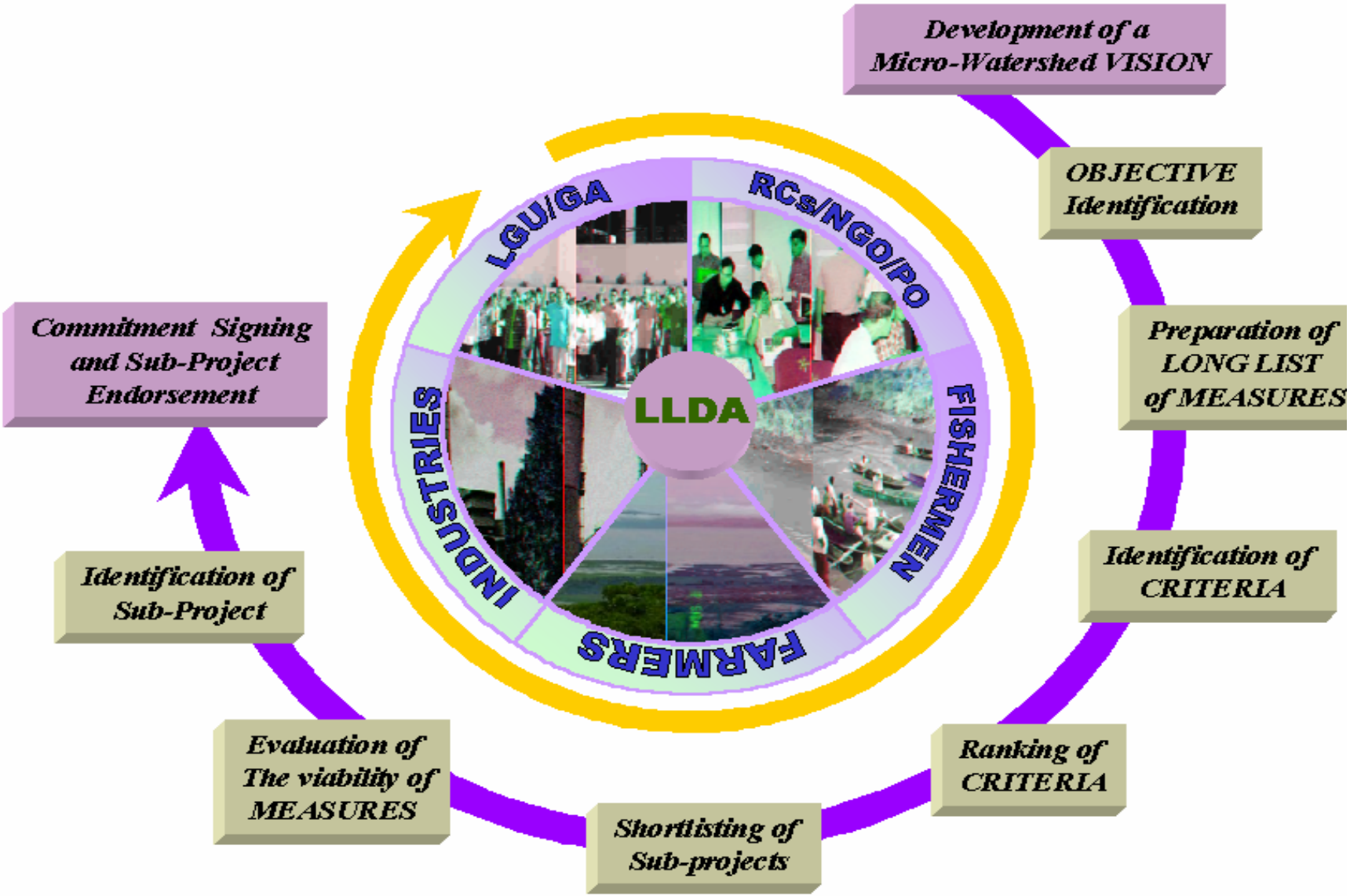
COMPONENT I:

Co-Managed Investments for Watershed Development

COMPONENT 2:

Strengthening Institutions and Instruments

The LEAP Process



What are to be done?

Improving Regulatory and Economic Instruments

- Expansion of the EUFS
- Improvement of the water trading system
- Development of the Public Disclosure Program
- Upgrading of the permitting, monitoring and enforcement procedures
- Capacity building and institutional learning

Strengthening Policy & Planning Support

- Water and Sediment Quality Monitoring and Reporting
- Application of the DSS and Development of Shoreland/Watershed Information System
- Strengthening of the Information, Education and Communication Program

Laguna de Bay Learning Forum

Public Disclosure Program for the *Laguna de Bay Region*

Features

- Employs “carrot-and-stick” approach
- Participatory and multi-sectoral.
- Combines “hard” and “soft” criteria.
- Includes public performance accounting of the regulating agency (i.e., LLDA

Laguna Lake Development Authority

Federation of River Basin Councils

Laguna de Bay Institutional Strengthening and Communitiy Participation (LISCOP) Project

Laguna de Bay Environment Monitor 2005

Laguna de Bay Community Carbon Finance Project

Meeting the Challenges of Sustainable Development

- So unique is the Laguna de Bay ecosystem – a lifeline for over 10 million Filipinos
- Its sustainability and usefulness should be ensured for many generations
- Build on the experience and lessons learned towards integrated water resources management

“ Healthy interaction between the lake and its people is largely built on mutual trust and common understanding among communities, institutions, organizations.How the seeds of understanding will grow is strongly linked to creating enabling environment where stakeholders are empowered to take the driver’s seat in planning, developing implementing and maintaining environmental and watershed improvement measures.. Contributing to long-term peace, sustaining partnership built upon a common vision of the lake as a life-support ecosystem”

Thank You & Good Day.

Laguna Lake Development Authority
2/3F Asia-Pro Bldg, Bo. Kapitolyo
Pasig City, Philippines
Contact Nos.
(632) 637-9037, (632) 637-9038,
(632) 637-97-48
Email Address:
dnnepomuceno@llda.gov.ph
Homepage:
www.llda.gov.ph