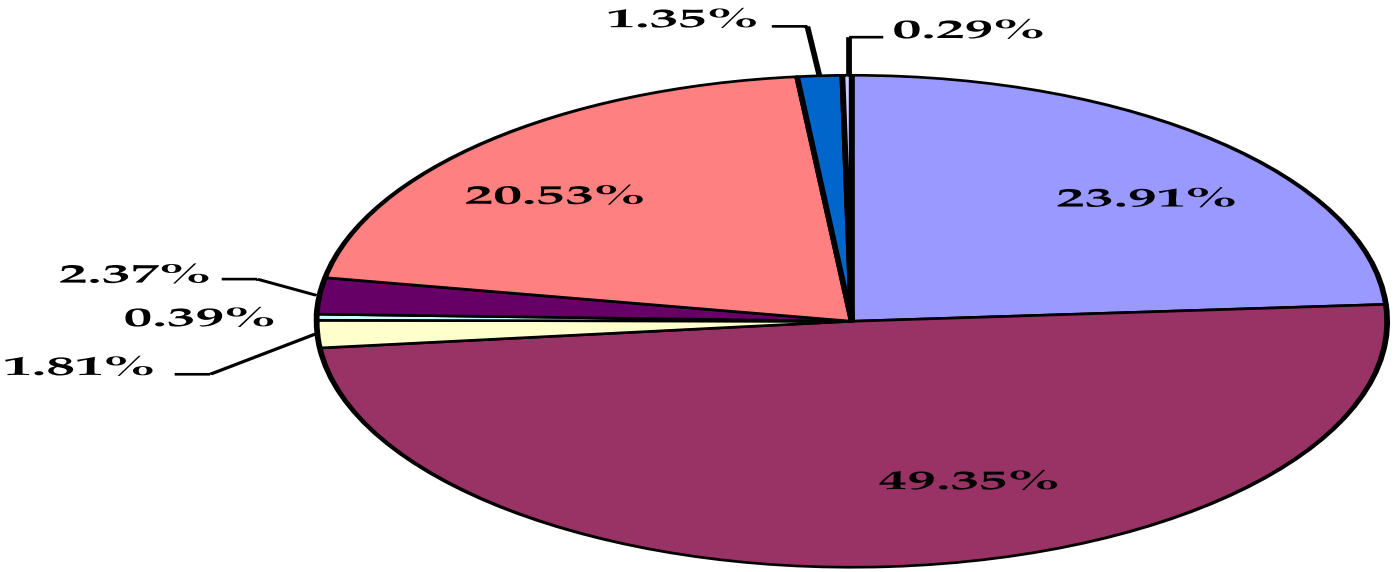
Mercury Monitoring in the Philippines and other Air Concentrations

Summary of the Mercury Inventory in the Philippines



1 — 23.91 % Extraction and use of fuels/energy resources

2 — 49.35% Primary (virgin) metal production
Primary (virgin) metal production

3 — 1.81% Production of other minerals and materials with mercury impurities

4 — 0.39% Intentional use of mercury in inductrial processes

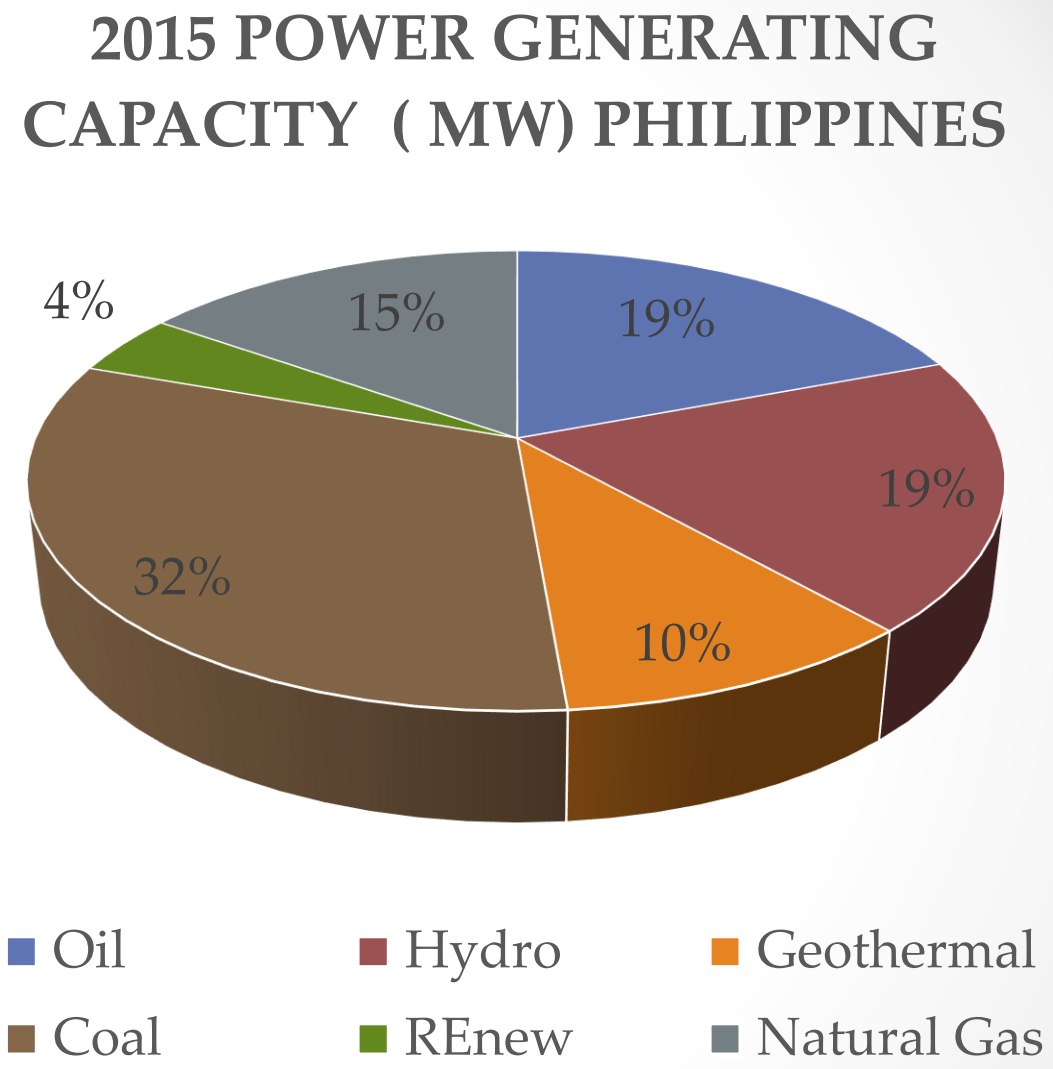
5 — 2.37% Consumer Products with intentional use of mercury

6 — 20.53% Other intentional product/process use

7 — 1.35% Waste deposition/landfilling & wastewater treatment

8 — 0.29 %Crematoria and Cemeteries
Crematoria and cemeteries

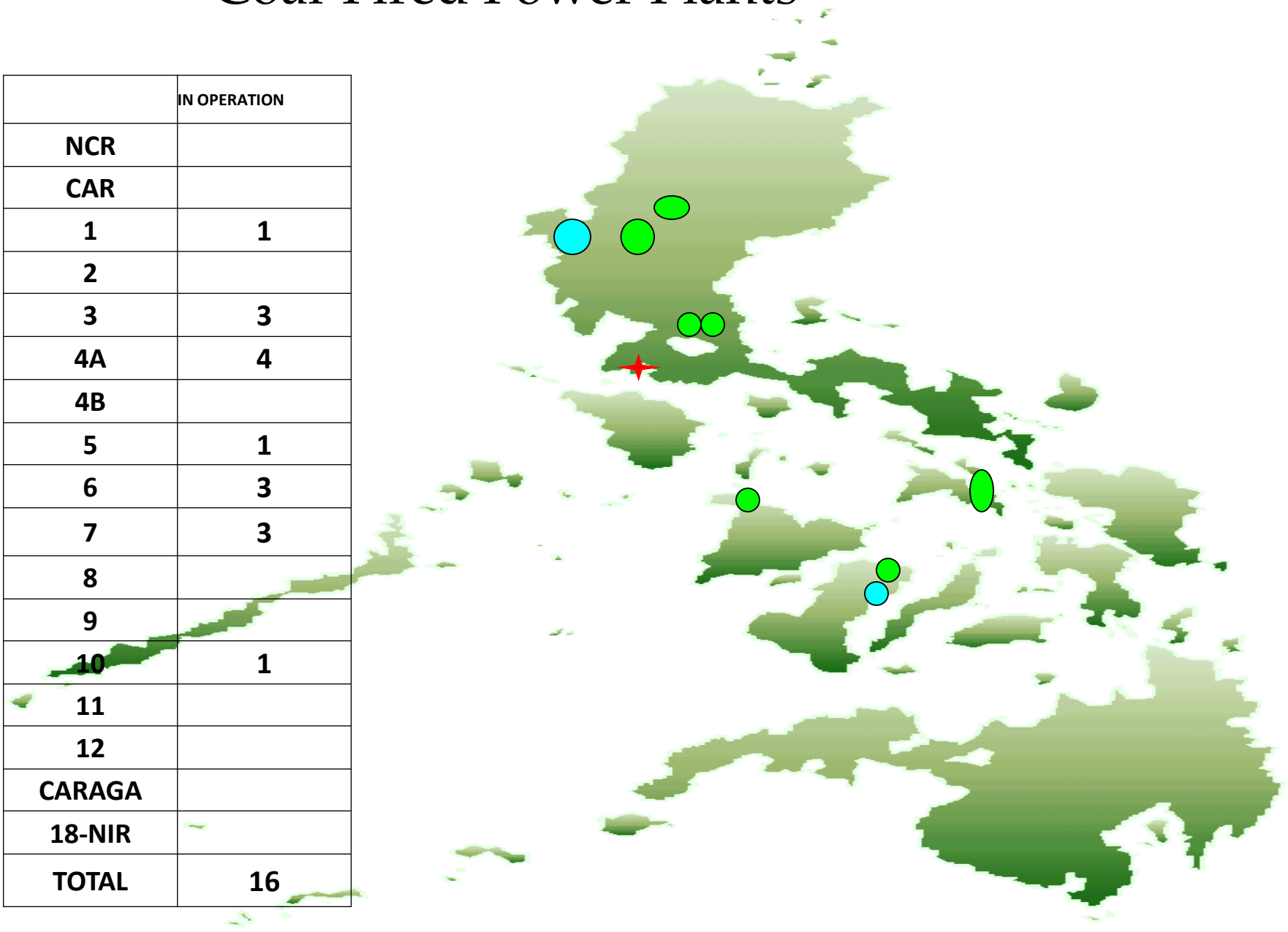
2015 POWER GENERATING CAPACITY (MW) PHILIPPINES		
	MW	%
Oil	3610	19%
Hydro	3600	19%
Geothermal	1917	10%
Coal	5963	32%
REnew	813	4%
Natural Gas	2862	15%
TOTAL	18765	100.00 %
SOURCE: DOE		



- SOURCE:http://www.doe.gov.ph/sites/default/files/pdf/energy_statistics/power_statistics_2015_summary.pdf

Coal-Fired Power Plants

	IN OPERATION
NCR	
CAR	
1	1
2	
3	3
4A	4
4B	
5	1
6	3
7	3
8	
9	
10	1
11	
12	
CARAGA	
18-NIR	
TOTAL	16



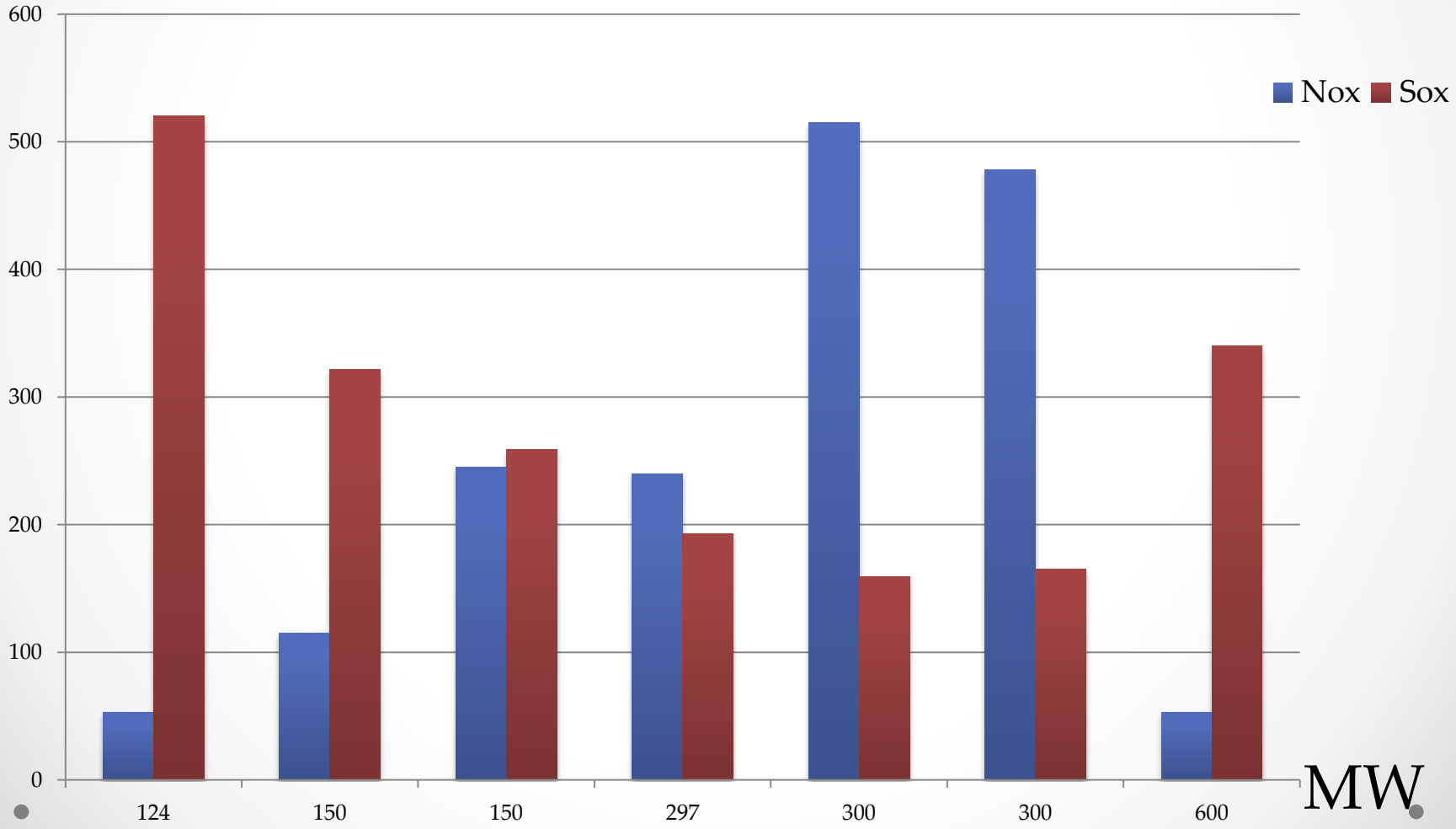
30 MW Coal-Fired Thermal Power Plant

PARAMETER	30 MW mg/Ncm	STANDARDS mg/Ncm
MERCURY	0.008	5
Sulfur Oxides (as SO2)	354	700
Nitrogen Oxides (as NO2)	205	1,000
Carbon	26	500

300 MW Coal-Fired Power Plant

PARAMETER	300 MW mg/Ncm	STANDARDS mg/Ncm
MERCURY	0.0028	5
Sulfur Oxides (as SO2)	1,361	1,500
Nitrogen Oxides (as NO2)	702	1,000
Carbon Monoxide	2	500

Mercury Emissions Below the DENR Standard



Coal Specification/APCD

	30 MW	300 Mw
Coal Type	bituminous	bituminous
% sulfur		0.9
Ash content		16.9
APCD	Electrostatic precipitators	Electrostatic precipitators

- Coal analysis for most tests were 0.9 to 1.0 % S
- 50 % of stack installations are with air pollution control devices
- Compliance standards differ with new and existing sources
- Determine compliance for coal-fired plants with high content of sulfur

Automated Monitoring

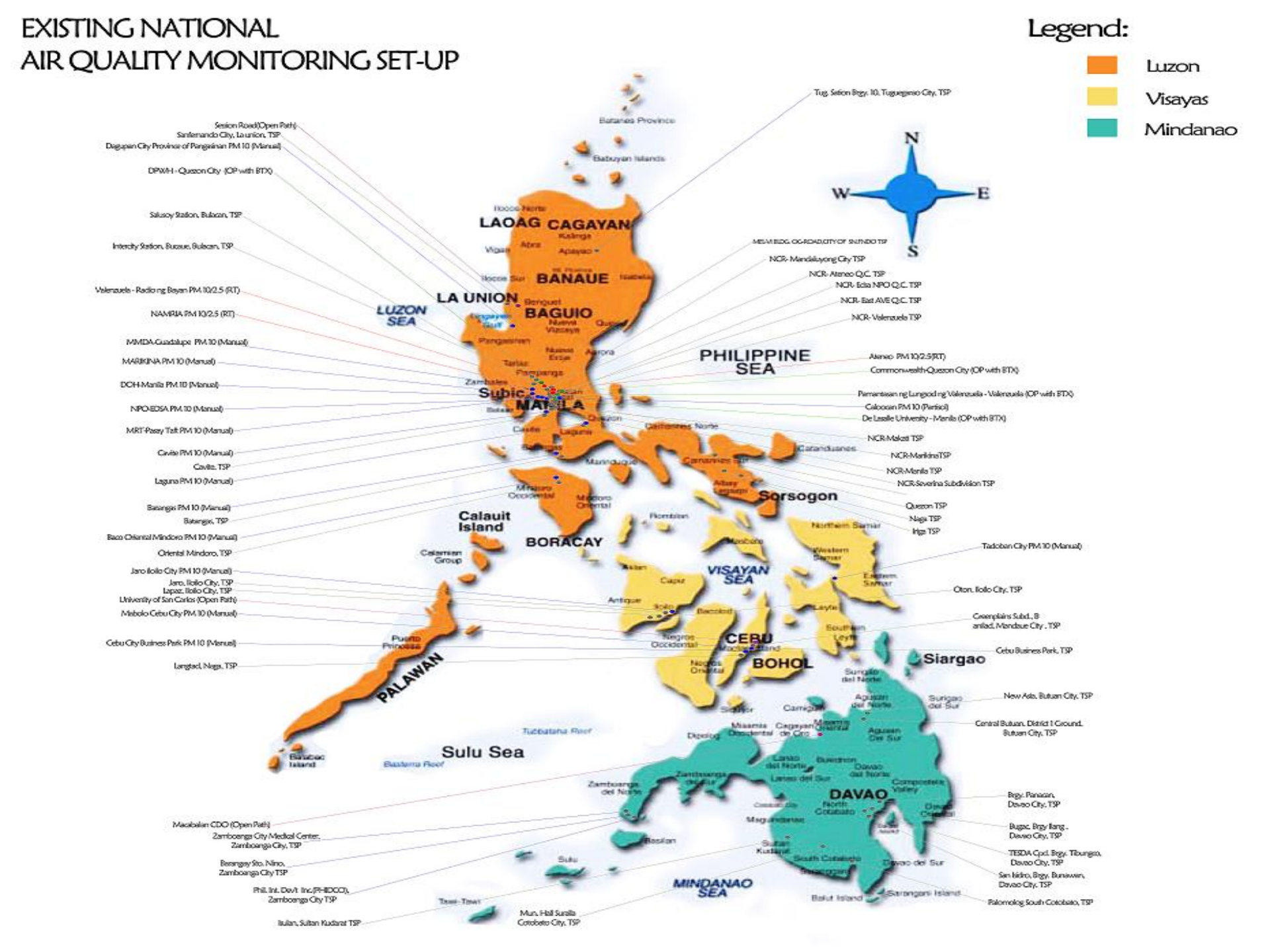
Republic of the Philippines
Department of Environment and Natural Resources
ENVIRONMENTAL MANAGEMENT BUR
Visayas Ave., Diliman, Quezon City

TEKRAN
TEKRAN

Tekran 2537 Mercury Monitoring
March 2015

Gaseous Elemental Mercury, ng/cu.m.

EXISTING NATIONAL AIR QUALITY MONITORING SET-UP



EANET

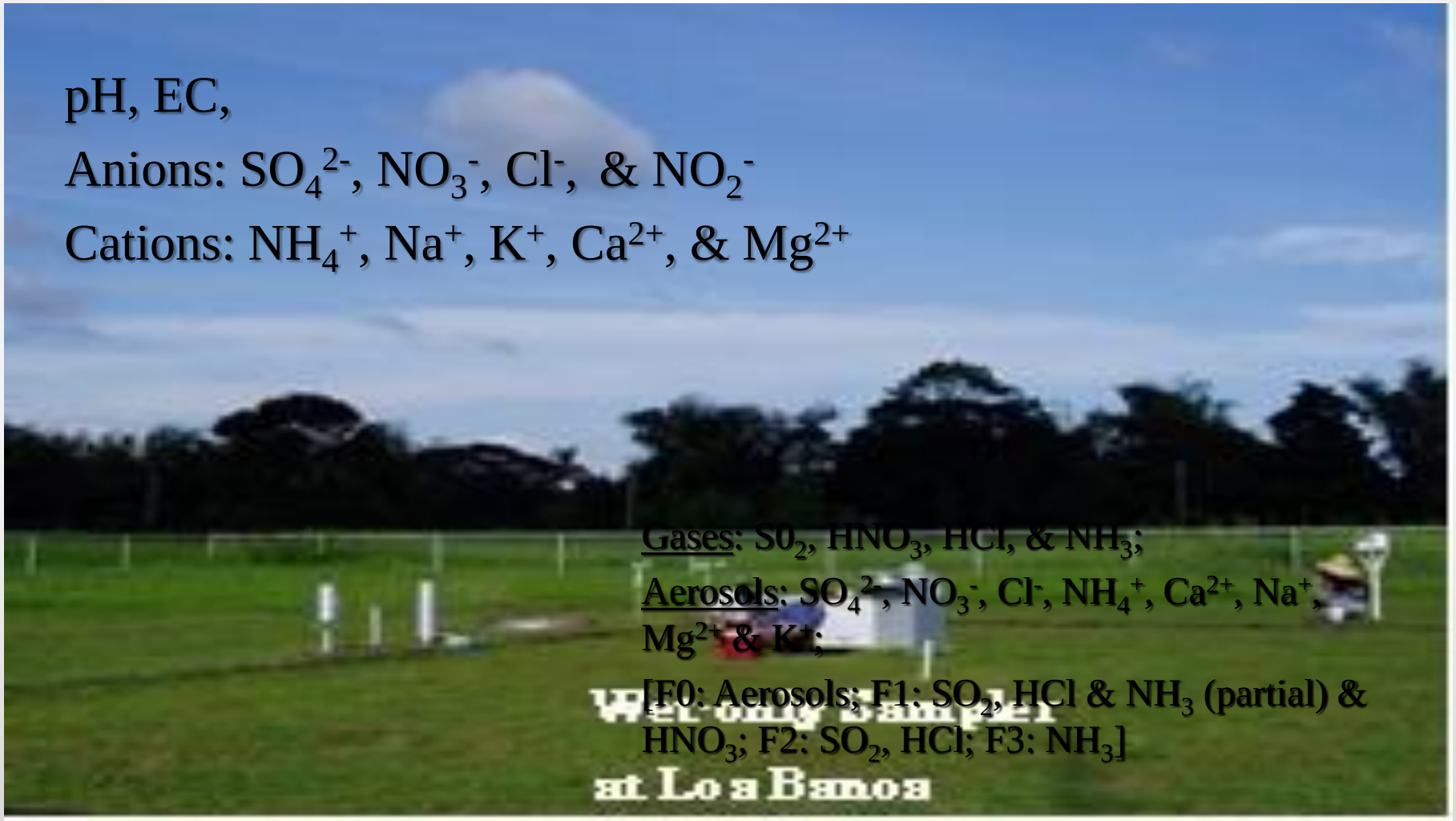
Wet/Dry Deposition Monitoring - Urban

Gases: $S0_2$, HNO_3, HCl, & NH_3;

Aerosols: SO_4^{2-}, NO_3^-, Cl^-, NH_4^+, Ca^{2+}, Na^+, Mg^{2+} & K^+;

[F0: Aerosols; F1: SO_2, HCl & NH_3 (partial) & HNO_3; F2: SO_2, HCl; F3: NH_3]

Wet/Dry Deposition Monitoring - Rural



Wet/Dry Deposition Monitoring - Remote

Inland Monitoring

BINGA FOREST
XPERIMENT STATION
Boneco, Tinongdan, Itogon, Benguet
Ecosystems Research & Development Service
Loakan Road, Baguio City

Catchment Area

- **Bayabas: closed forest, continuous flow through a year**

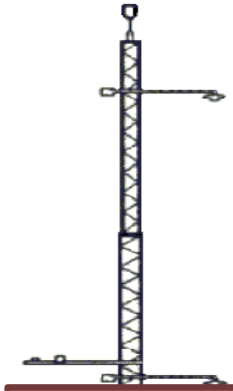
Status of EANET/non-EANET Air Concentration Monitoring（1/2

Total number of Air Concentration monitoring sites		Responsible Organization
EANET site	4	National Government (EMB-DENR)
non-EANET site	18	National Government (EMB-DENR (Real time-automatic) /criteria+ PM10/2.5
	9 + 27	National Government (EMB-DENR PM 10 manual/reference method/continuousPM10/2.5
	9	TSP manual/reference method
Total	**74**	

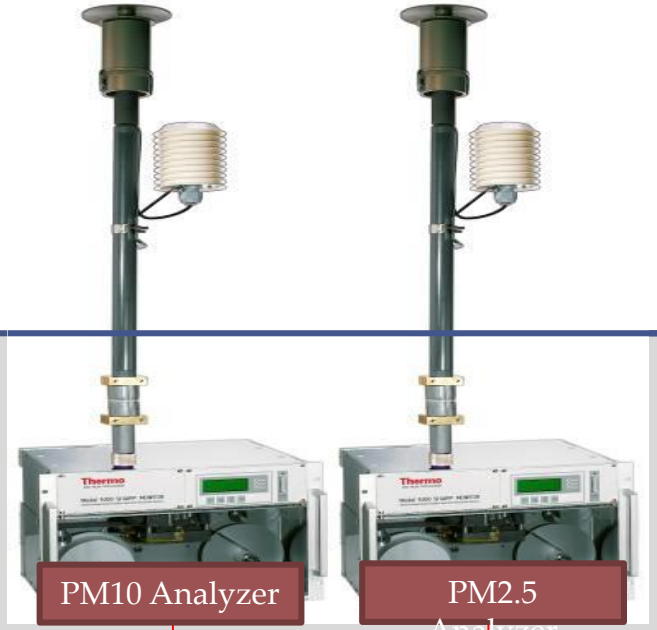
Monitoring parameters	Number of sites	Time resolution
SO_2	21	minute
NO_x	21	minute
O_3	21	minute
PM_{10} (SPM)	37	minute
$PM_{2.5}$	37	minute

(open path- DOAS (O3, NO2, SO2, BTX), TEOM (PM10/2.5), CO

PM10/PM2.5 (BAM)



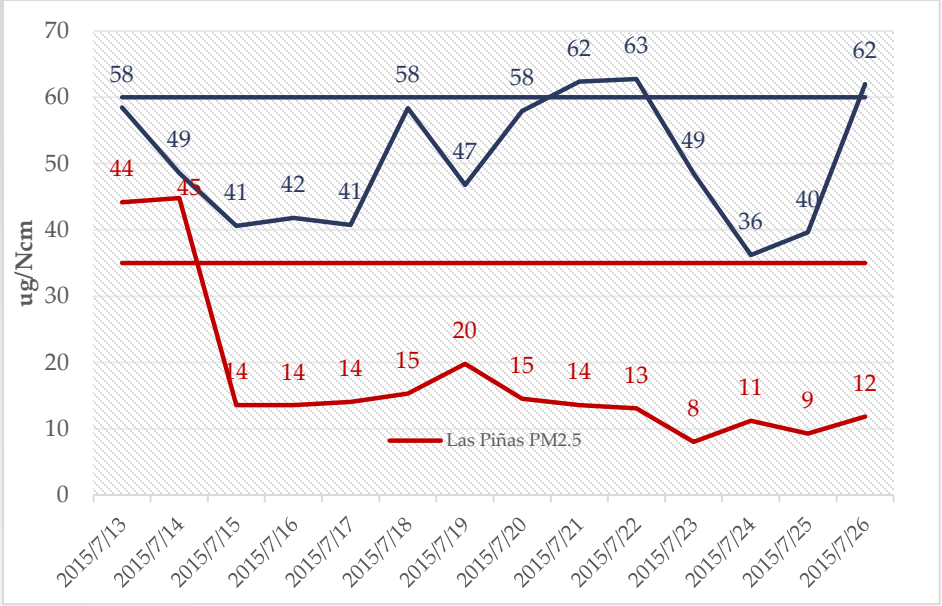
Met Sensors

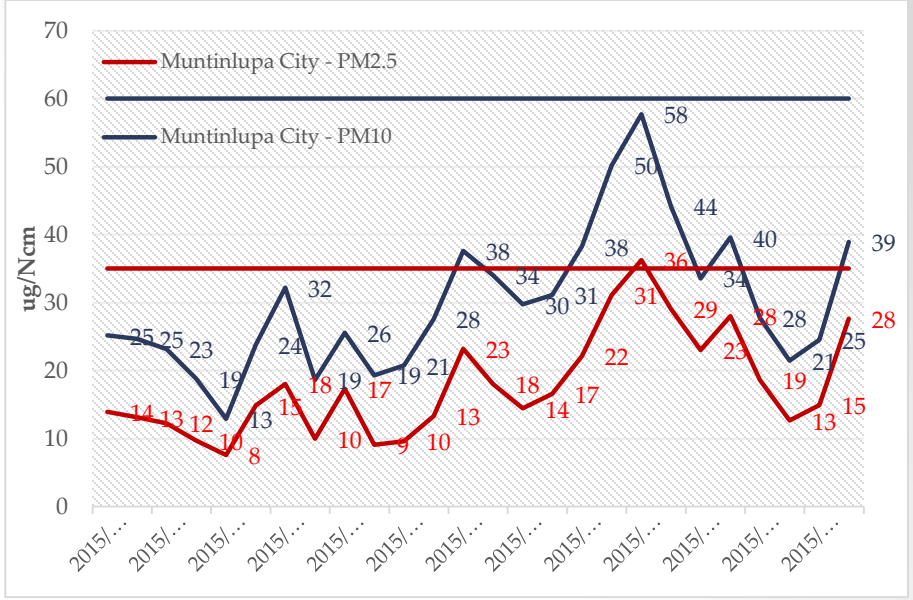


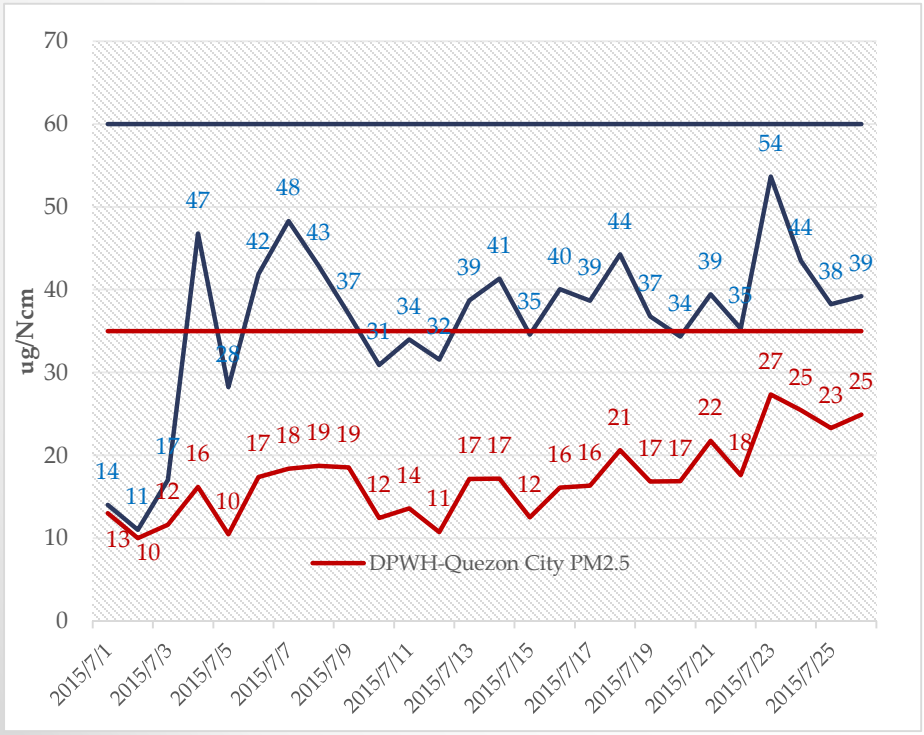
PM10 Analyzer

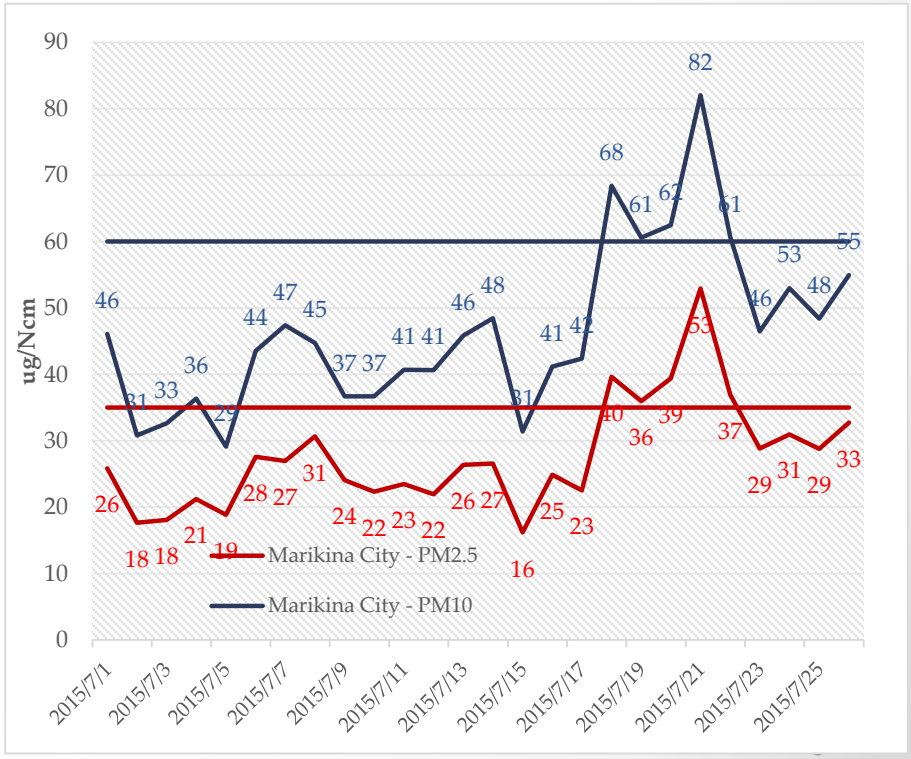
PM2.5 Analyzer

WEBlogger for Data Communication


ug/Ncm
Las Piñas PM2.5
2015/7/13
2015/7/14
2015/7/15
2015/7/16
2015/7/17
2015/7/18
2015/7/19
2015/7/20
2015/7/21
2015/7/22
2015/7/23
2015/7/24
2015/7/25
2015/7/26


ug/Ncm
Muntinlupa City - PM2.5
Muntinlupa City - PM10


ug/Ncm
DPWH-Quezon City PM2.5
2015/7/1
2015/7/3
2015/7/5
2015/7/7
2015/7/9
2015/7/11
2015/7/13
2015/7/15
2015/7/17
2015/7/19
2015/7/21
2015/7/23
2015/7/25


ug/Ncm
Marikina City - PM2.5
Marikina City - PM10
2015/7/1
2015/7/3
2015/7/5
2015/7/7
2015/7/9
2015/7/11
2015/7/13
2015/7/15
2015/7/17
2015/7/19
2015/7/21
2015/7/23
2015/7/25