



14th Session of the Intergovernmental Meeting of the Malé Declaration

Country Report: Pakistan

By:

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Government of Pakistan





Basic Facts

Pakistan: Key Statistics

Official name	Islamic Republic of Pakistan
Capital	Islamabad
Area (Thousands of km ²)	796
Total population	191.71 million
Population growth rate	1.92 %
Life expectancy for males**	64 years
Life expectancy for females**	66 years
Gross Domestic Product (GDP)growth	4.24 %
Agriculture Growth	2.9 %
Manufacturing Posted Growth	2.5 %
Total revenues collected	Rs 2682.6 billion
Per capita income	\$1512

Environmental Governance in Pakistan

- Originally the authority vests with the Federal Government, through the Pakistan Environmental Protection Act (PEPA) 1997
- Environmental Protection Tribunals are functional in Punjab, Sindh, Balochistan and KPK, whereas Pak EPA is dependent on the Punjab Tribunal for adjudication.
- The technical and financial support of the federal government (Ministry of Environment) through foreign funded projects has enabled the provincial governments to establish Environmental Protection Agencies in Punjab, Sindh, Balochistan, KPK, GB and AJK fully empowered to implement environmental regulations (following Section 8, PEPA 97)



State of Environment



Tarbela Dam capacity has decreased by 29.32% due to siltation of its reservoir. The main cause of which is upstream deforestation



Degradation of Margalla Hills at Taxila



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**Mushroom Stone Crushers adding
particulate matters to air**



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**Unscientific Quarrying giving
ugly looks to Margalla Hills**



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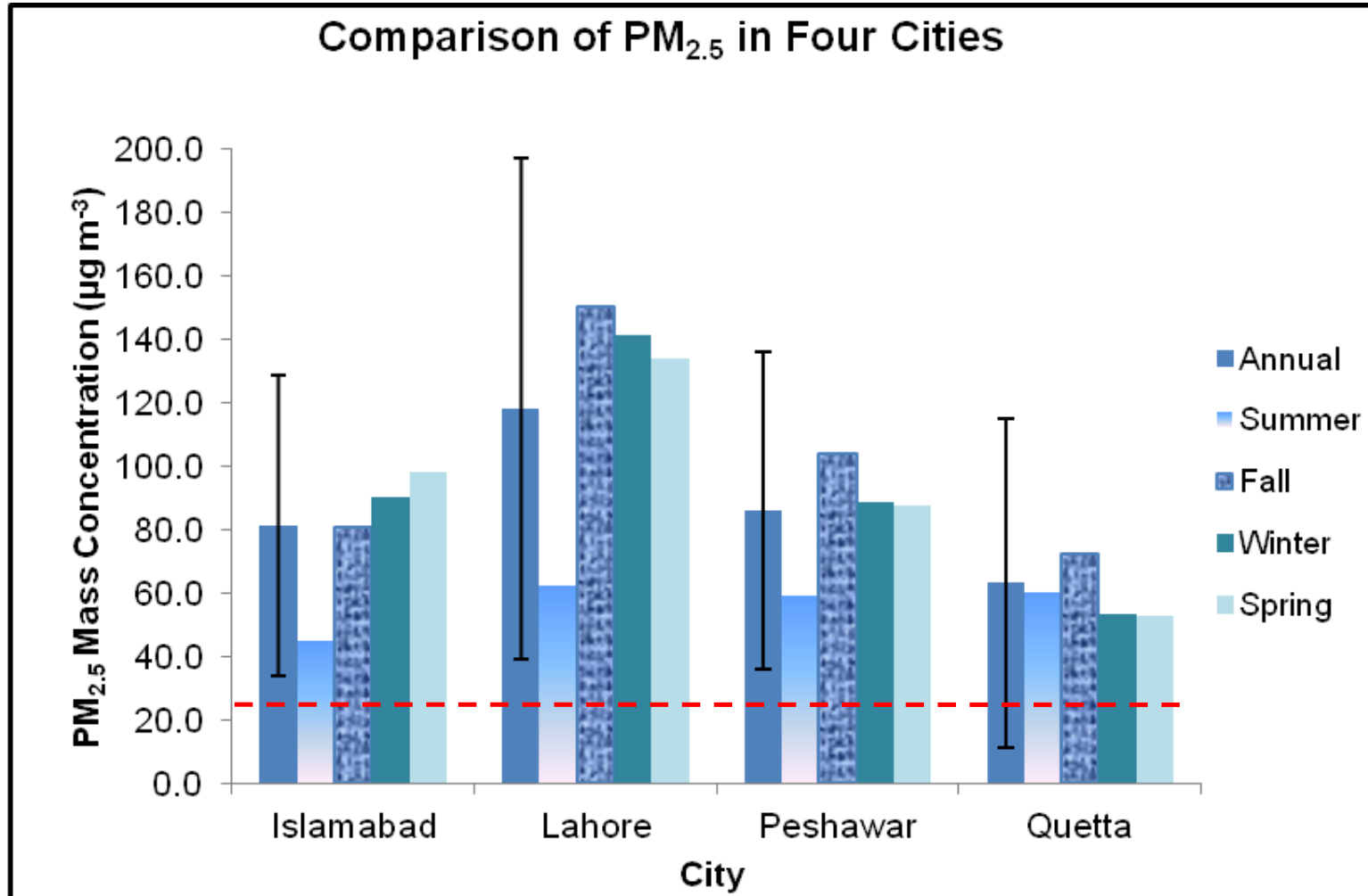


Sources of Air Pollution

- Major sources are vehicles, power plants, industries and brick kilns.
- Transport-related: Old and poorly functioning vehicles, diesel trucks, two-stroke two wheelers and Rickshaws.
- High level of sulfur in diesel.
- Burning of municipal solid waste is significant, almost 57,000 tons of solid waste is generated each day, most of which is either dumped or burnt.

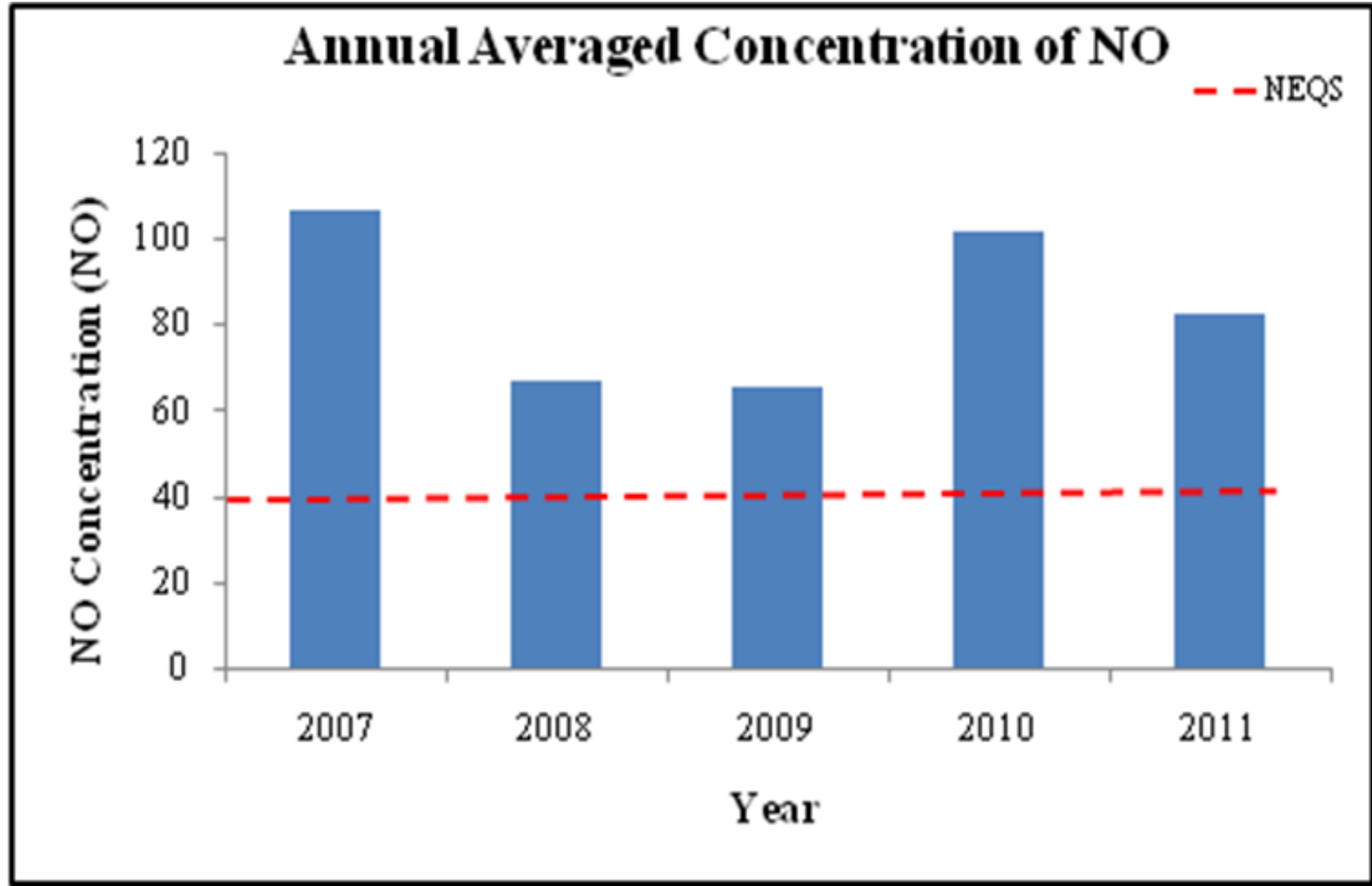


PM_{2.5} Mass Concentration in Four Cities



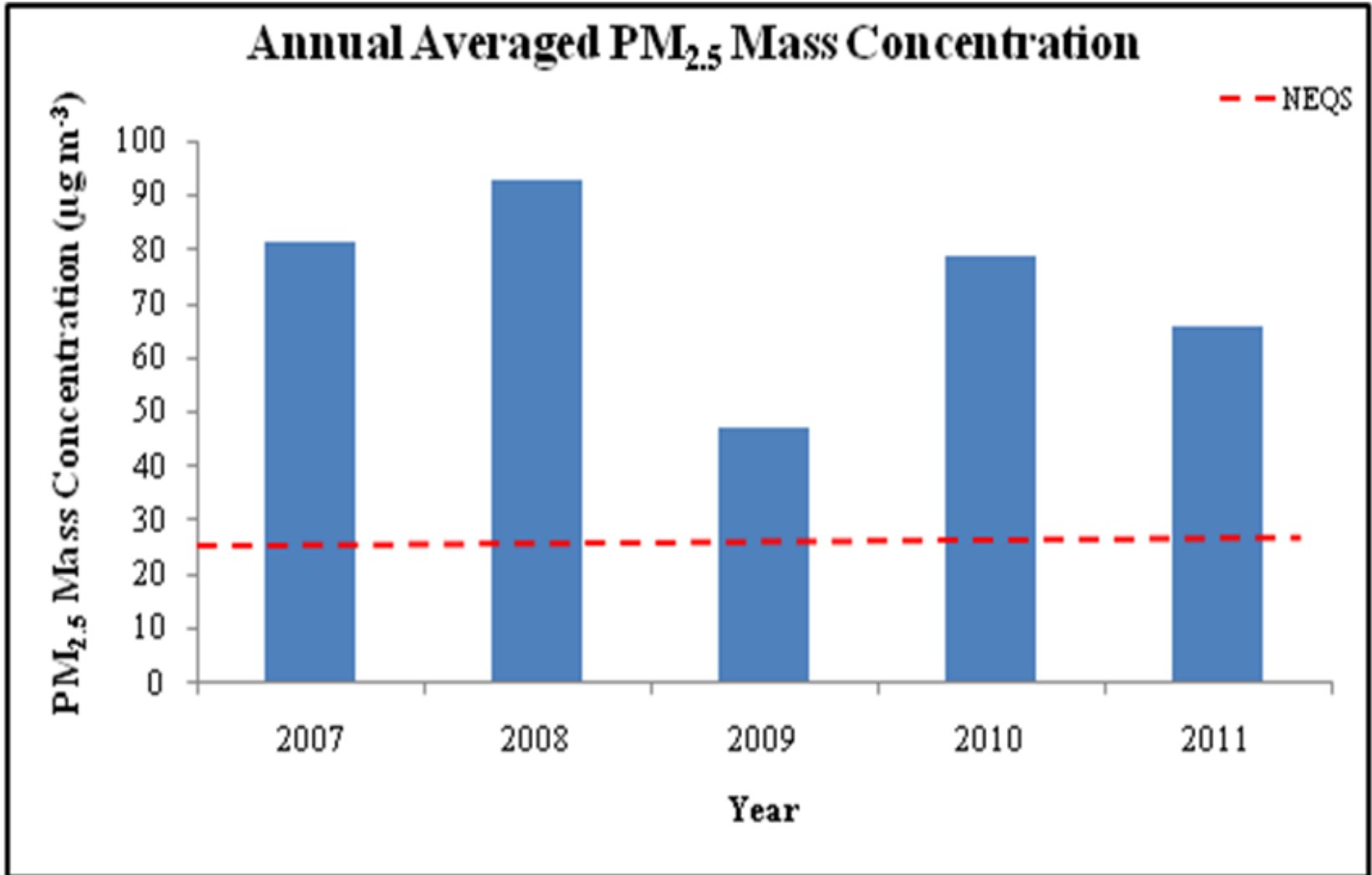


Ambient NO Conc. in Islamabad



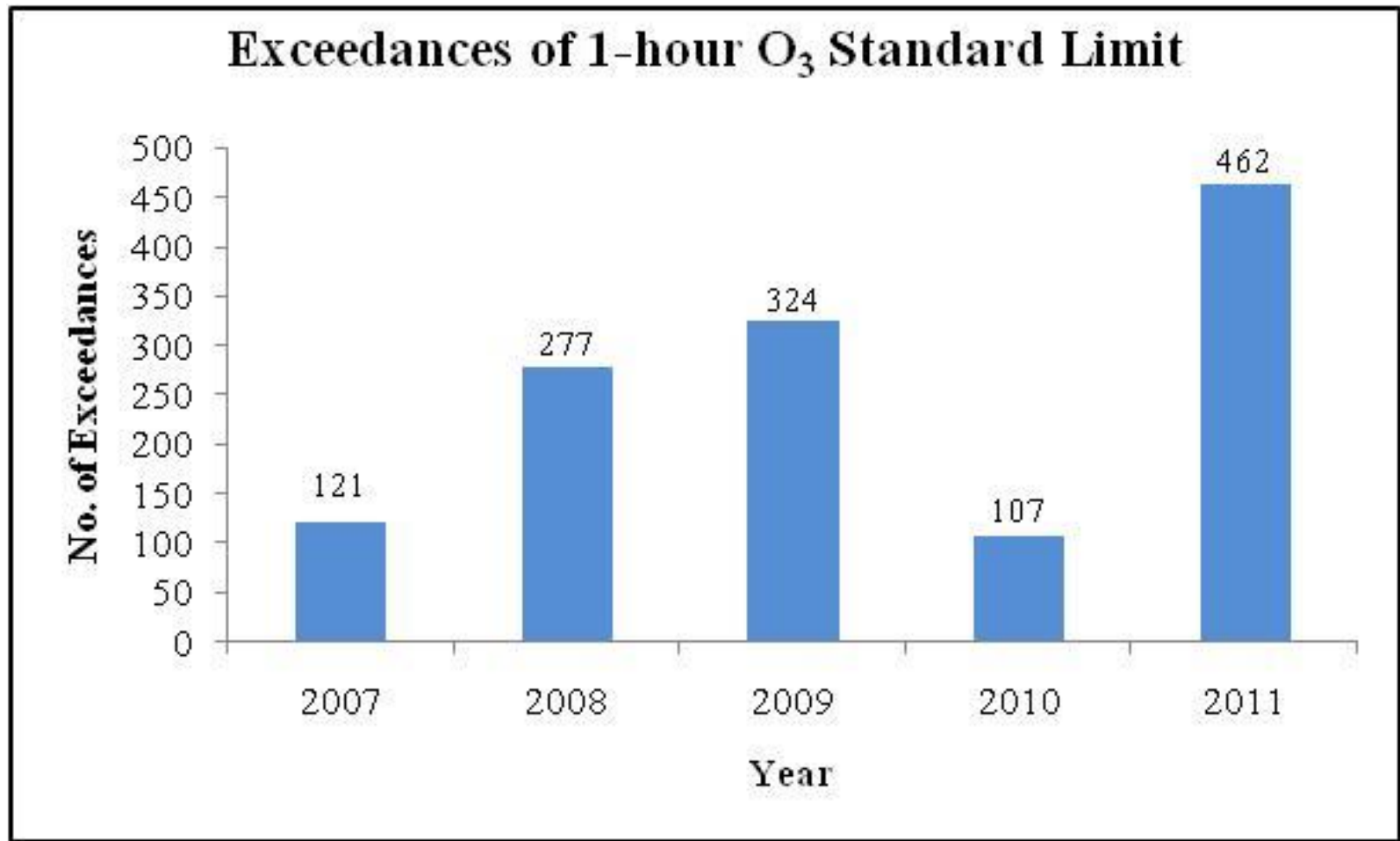


Ambient PM_{2.5} Conc. In Islamabad



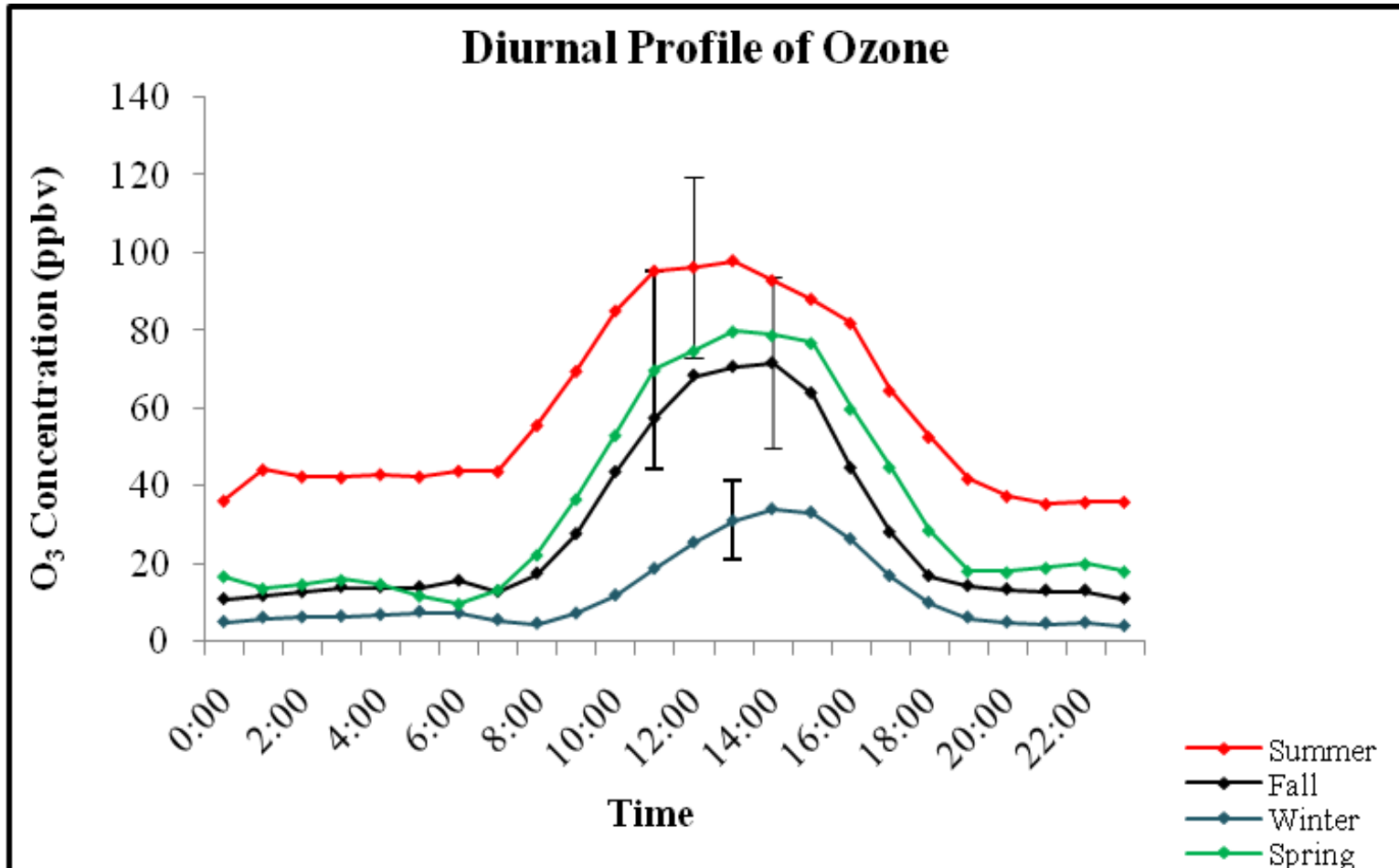


Hourly O₃ Exceedances-Islamabad





Diurnal Profile of O₃ - Islamabad



	Wind Speed	Wind Direction	Temp	RH	Radiation	NO	NO2	NOx	CH4	NMHC	THC	CO	SO2	O3	PM2.5
units	m/s	degrees	°C	%	W/m2	µg/m³	µg/m³	µg/m³	ppm	ppmC	ppm	mg/m³	µg/m³	µg/m³	µg/m³
*NAAQS						40 ug/m³	40ug/m³	80 ug/m³				5 mg/m³ 8hrs	120 ug/m³ 24hrs	130 ug/m³ 1hrs	35 ug/m³ 24hrs
Jul-2014	0.15	70.81	40.86	20.5	655.1	10.34	26.7363	37.0763	2.255	2.0215	4.283	1.02775	36.47	3.21	94.335
Aug-2014	S.N.O	S.N.O	32.2	67.7	210.3	10.0	25.6	35.6	*	*	*	0.718	21.2	446.9	-
Sep-2014	0.1281	71.89	29.64	41.93991	3.456	10.44	28.25	38.69	3.2805	0.919	4.199	4.21	36.05	5.82	151.0
Oct-2014	0.1283	73.36	29.64	41.93755	3.449122	11.67	33.08	44.75	A.N.O*	A.N.O*	A.N.O*	4.217	36.07	5.80	-
Nov-2014	0.1278	74.9384	29.64	41.93	3.45087	10.567	36.6562	47.2232	A.N.O*	A.N.O*	A.N.O*	4.217	36.05	5.80	-
Dec-2014	0.126617	76.52	29.62	41.95313	3.4273	10.5094	36.7404	47.2498	A.N.O*	A.N.O*	A.N.O*	4.217	36.04	6.0	-
Jan-2015	S.N.O	S.N.O	14.65	96.02	3.9273	9.150	34.1694	43.3194	A.N.O*	A.N.O*	A.N.O*	0.798	35.15	6.3429	-
Feb-2015	S.N.O	-	21.1	69.8	8.7	8.5	27.33	35.83	A.N.O*	A.N.O*	A.N.O*	1.574	32.0	17.8	-
Mar-2015	S.N.O	-	15.4	84.4	49.6	8.7	25.45	34.15	A.N.O*	A.N.O*	A.N.O*	0.958	32.5	1.4	87.1
Apr-2015	S.N.O	-	36.3	32.6	511.1	9.4	26.7	36.1	A.N.O*	A.N.O*	A.N.O*	1.119	32.3	5.9	88.6
May-2015			41.7	14.4	415.2	9.9	24.07	33.97	-	-	-	3.023	32.7	A.N.O*	149.7
Averages						9.925127	29.52566	39.45079				2.3709	33.3209	39.52	113.75

State of Environment - Pakistan

- Environmental situation in Pakistan has reached a critical stage. As per World Bank studies, economic loss due to environmental degradation has been increasing exponentially

2006

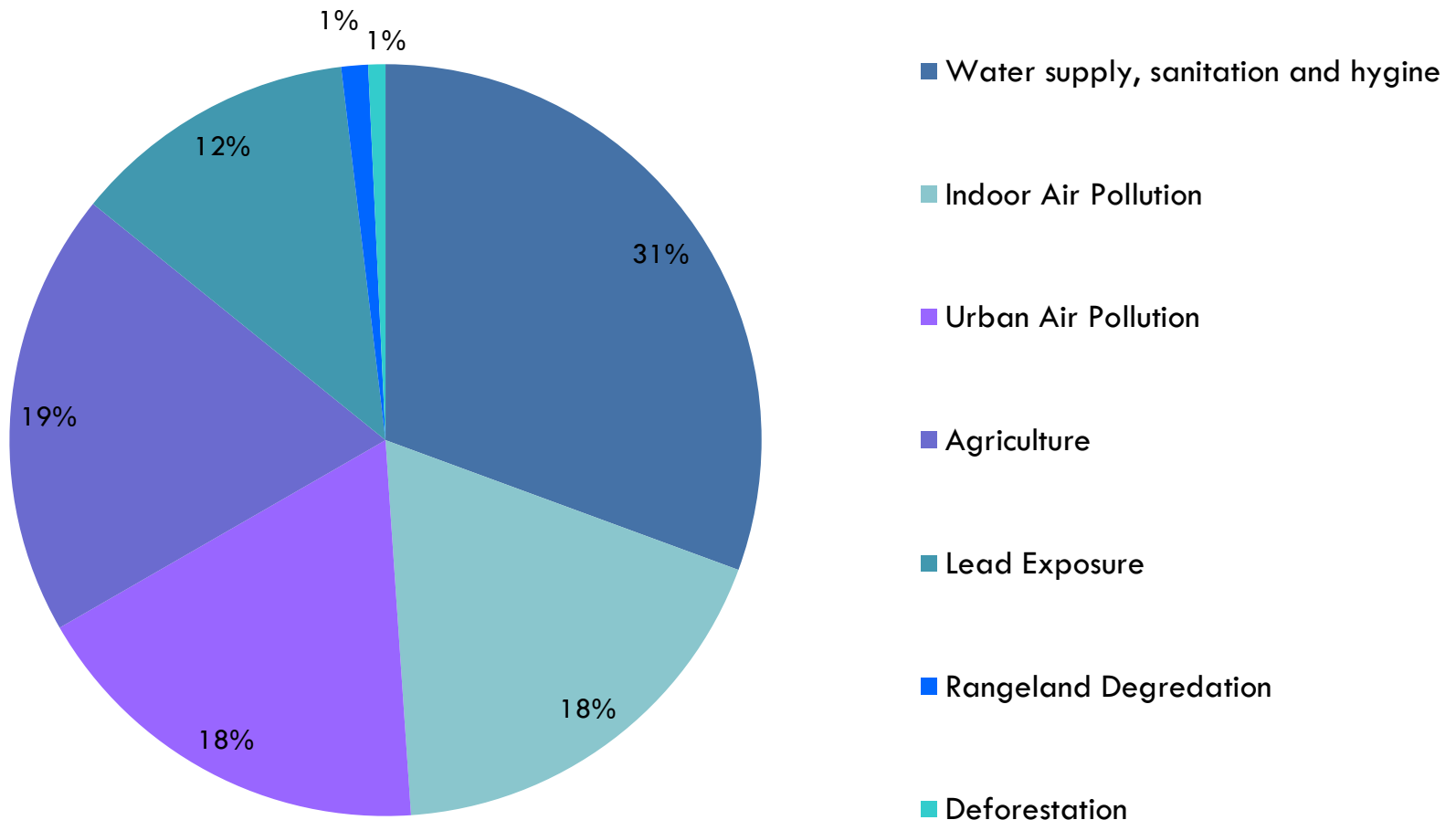
- Rs. 365 billion per annum

2009

- Rs. 900 billion per annum

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Pakistan - Environmental Debt



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Health Impact Assessment in Pakistan

Health End-Points	Attributed Total Cases	Total Annual Costs
Premature mortality adults	21,791	58-61
Mortality children under 5 yrs	658	0.83
Chronic Bronchitis	7,825	0.06
Hospital Admissions	81,312	0.28
Emergency room visits/ outpatient hospital visits	1,595,080	0.80
Restricted activity days	81,541,893	2.06
Lower respiratory illness in children	4,924,148	0.84
Respiratory symptoms	706,808,732	0.00
Total		62-65

Source: Pakistan Strategic country Environmental Assessment Report by World Bank, 2006



Status of Implementation



Malé Declaration Phase-I



Phase- I Implementation

- Carried out a baseline report
- Preparation of National Action Plan for air pollution
- Compilation of experts' database
- Created a database on air pollution
- Formulation of a national action plan to cope with the air pollution.
- Developed a national emission inventory in 2000



Malé Declaration Phase-II



Phase- II Implementation

- Monitoring station installed at Bahawal Nagar after feasibility study.
- A capacity building programme was initiated in Phase-II of the implementation programme
- Trainings on air quality monitoring were conducted.
- National and regional level stakeholders' consultations were held during this Phase.
- Capacity building activities initiated during the implementation of Phase-II have made significant impact at the national level.



Institutional Arrangement

- A Memorandum of Understanding (MOU) was signed between Pak-EPA and Pakistan Meteorological Department (PMD) to establish and for proper functioning of Trans-boundary Air Pollution Monitoring Station under Male' Declaration.
- PMD Officials and staff are looking after the Laboratory and carrying out the monitoring activities.



Monitoring Equipment

- Ambient air monitoring equipment for Particulate Matter [PM_{10} and TSPM (Total Suspended Particulate Matter)]
- Bulk collector - for deposition monitoring
- Wet-only collector – for acidic gas deposition
- Diffusive samplers (for Nitrogen Dioxide, Sulfur Dioxide and Ozone) according to the monitoring protocol
- All equipment were installed according to the monitoring protocol under Malé Declaration



Monitoring Site-Bahawal Nagar



Industries located around monitoring station



Haze / Fog phenomena in winter in Bahawalnagar

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- Monitoring Station comprising a Laboratory was established at Bahawal Nagar in January 2007 for Trans-boundary Air Pollution Monitoring under Male' Declaration.



Lab. Equipment

- High Volume Samplers
- Bulk collector - for deposition monitoring
- Wet-only collector – for acidic gas deposition
- Diffusive samplers (for Nitrogen Dioxide, Sulfur Dioxide and Ozone) according to the monitoring protocol
- UV-Spectrophotometer
- pH Meter
- Electricity Conductivity Meter



Laboratory





Training on Air Sampler



Demonstration on Diffusion Samplers



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Training on Bulk Collector



Training on Wet Only Collector



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On-Site Monitoring Activities

- PM_{10} , NRSPM & TSPM - Analyzed at the Monitoring Site.
- Samples for Analysis of SO_2 & NO_2 have been sent regularly to Swedish Environmental Research Institute, Sweden.



Malé Declaration Phase-III



Phase- III Implementation

- Meeting of **National Advisory Committee** could not be held.
- National report on status of trans-boundary air pollution was provided after the exchange programme.
- Monthly data reports of monitoring results for a 3-year period i.e., January, 2006 to October, 2008 have been sent to UNEP RRCAP.
- **Emission inventory** could not be developed as the Pak-EPA official who got training moved to another organization.



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Phase- III Implementation

- Inter-comparison study-completed.
- A study on '**Crop Impact Assessment**' was conducted through Punjab University conducted
- A study has been conducted in September, 2007 to determine the exposure level of school children to major air pollutants.
- Pak-EPA's official got training in corrosion impact assessment.
- **Regional integrated assessment and atmospheric transport modeling could not be completed** due to expertise constraints.



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Phase- III Implementation

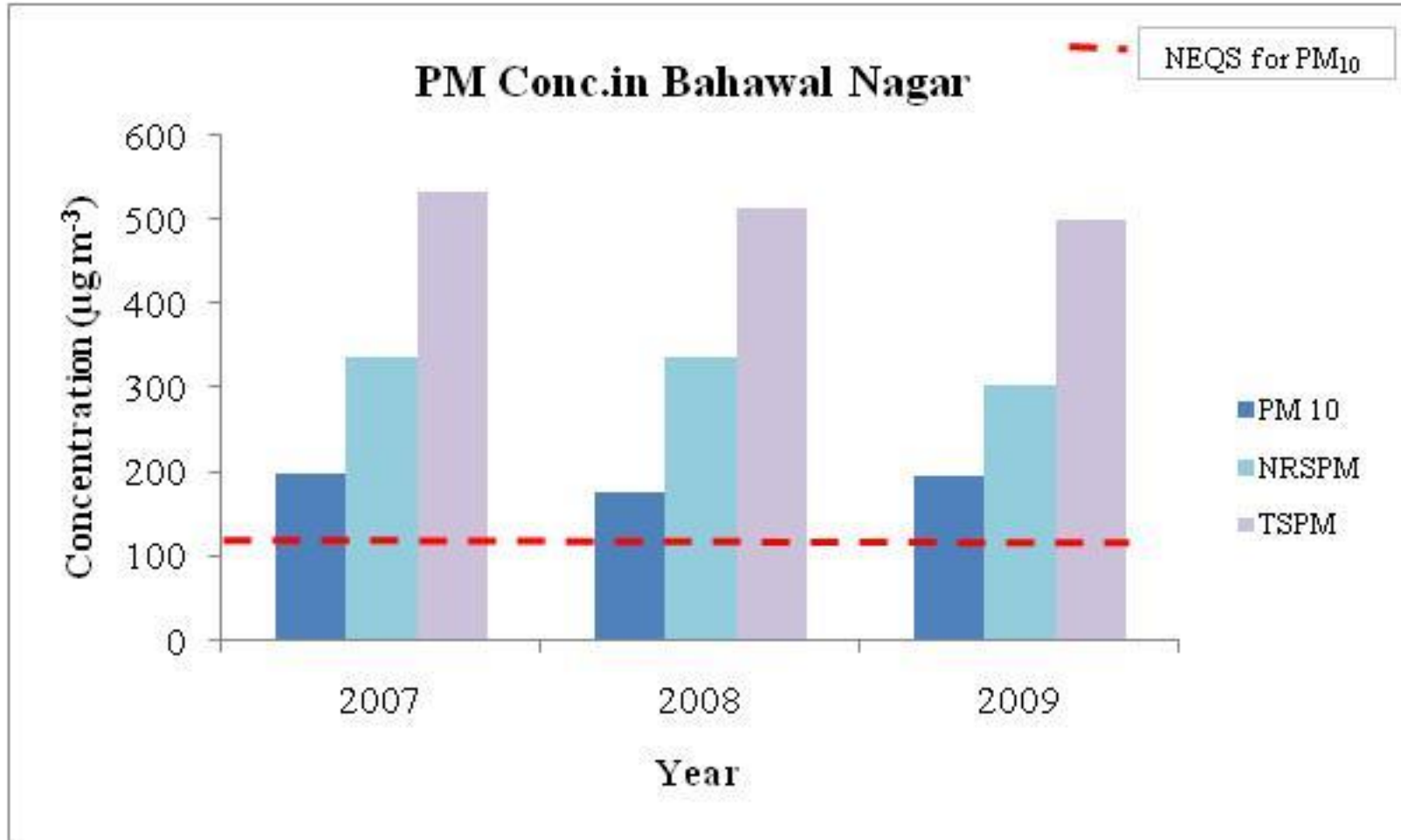
- Study on ‘**Corrosion Impact Assessment for buildings**’ could not be carried out.
- Pak-EPA’s officials got training in soil acidification held in March, 2008.
- Study on ‘**Soil Acidification**’ could not be conducted as the trained official moved to another organization.
- **Official nomination** of expert institution in the following fields is pending:
 - Development of urban rapid integrated assessment programme
 - Human health impact assessment programme
 - Corrosion impact assessment programme
 - Soil impact assessment programme



Monitoring Activities under Malé Declaration

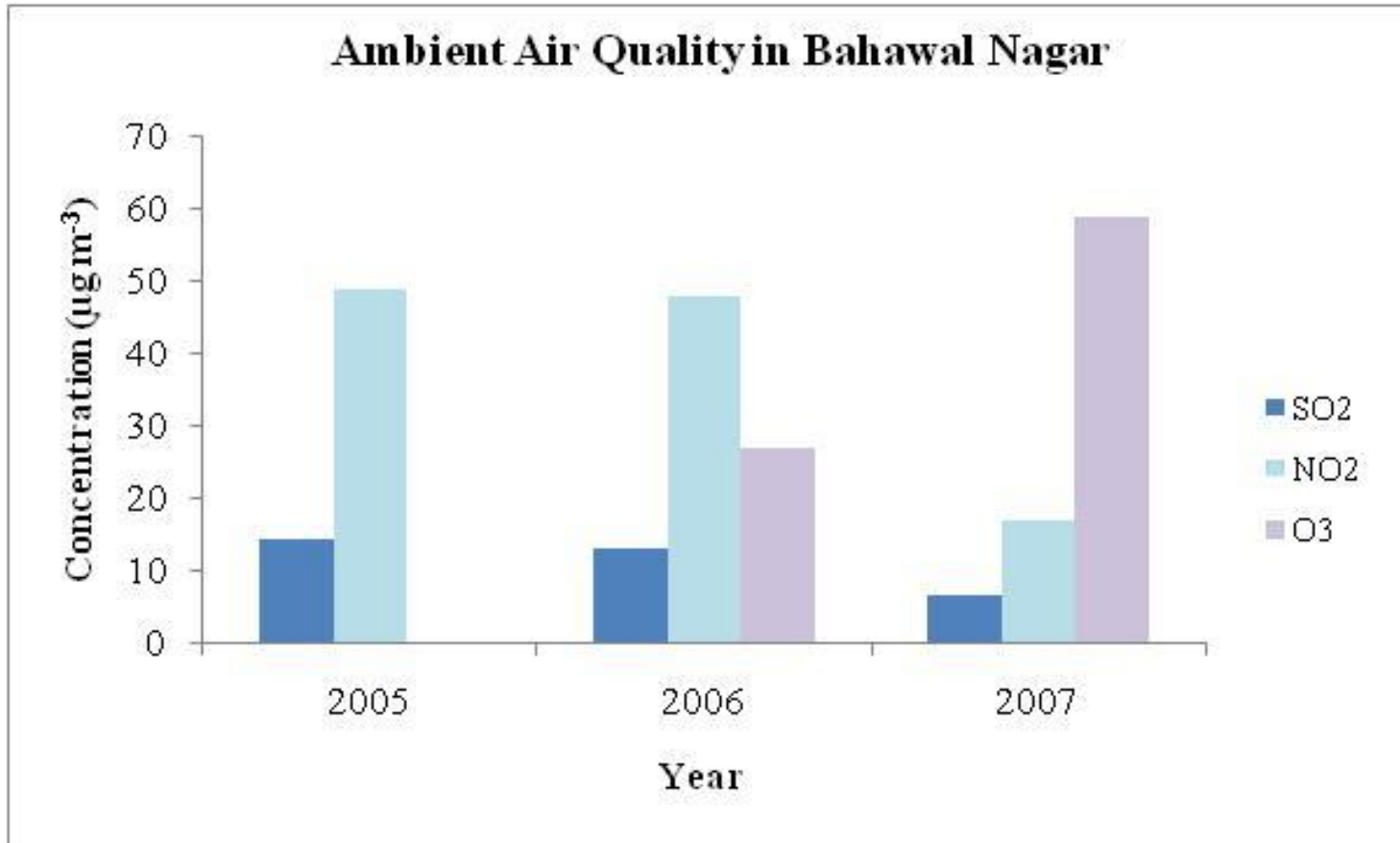


Particulate Conc. in Bahawal Nagar





Ambient Air Quality of Bahawal Nagar





Inter-Comparison Study

- Inter-comparison study was conducted two times for QA/QC.
- One Set of Four Samplers for NO_2 and SO_2 was Analyzed by the Analysis Protocol Employed at Pak-EPA's Laboratory
- Second Set of 4 Samplers was analyzed by NUS.



Crop Impact Assessment

- Punjab University was nominated as Institute to carry out the Study on 'Crop Impact Assessment' which has been completed.
- Pak-EPA is not being Informed About the Developments of Experiments Being Done by the Expert Institute Designated for the Job.



Malé Declaration Phase-IV



Health Impact Assessment

Research Study- Level of Exposure of School Children to Air Pollutants

Objectives:

- To Monitor the Level of NO_2 and SO_2 in Ambient Air in order to Know the Spatial Variation of this Important Traffic Related Air Pollutant.
- To Determine the Level of Exposure of School Children to Air Pollutants.

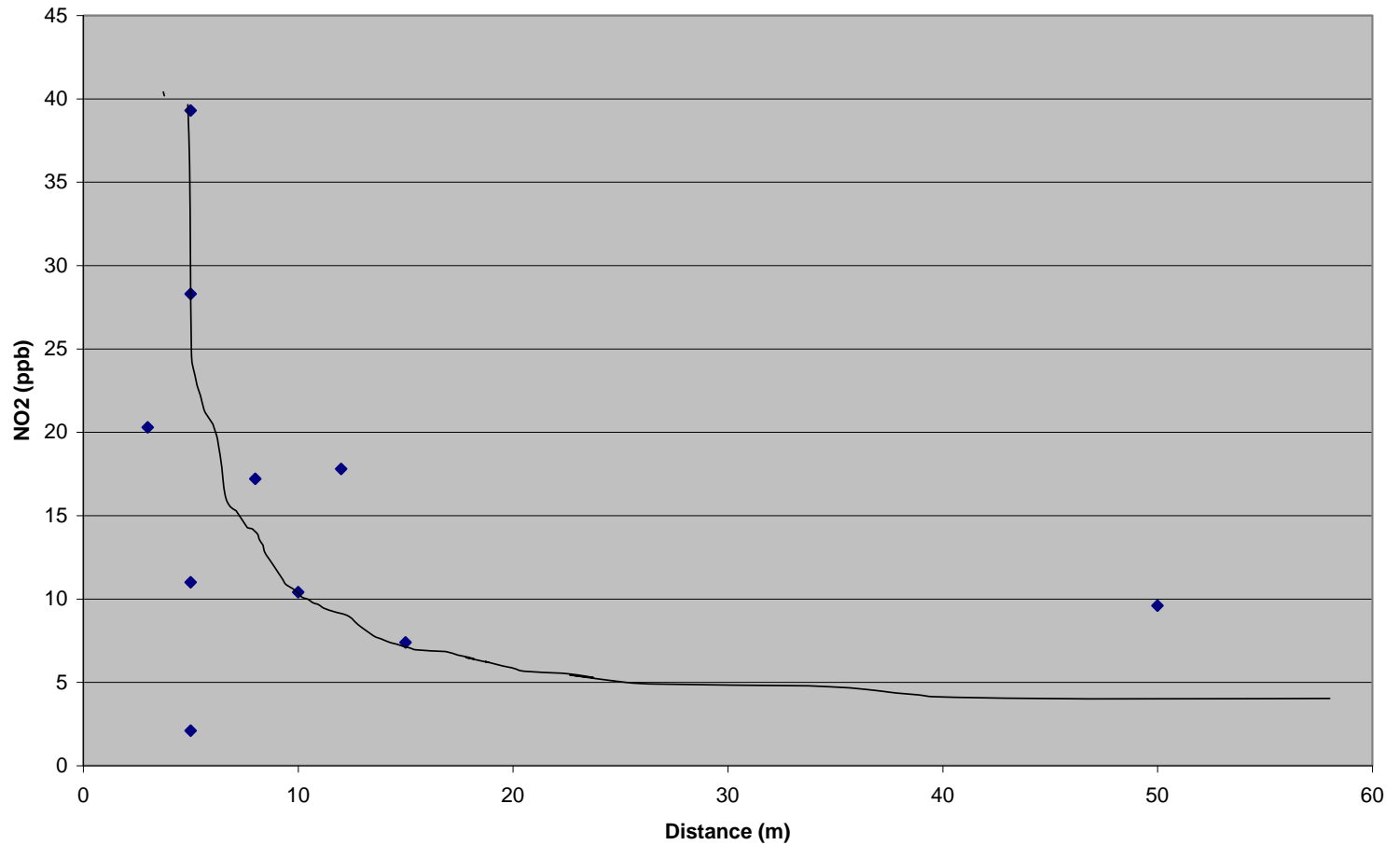


Activities Undertaken

- A 5-Days Comprehensive Study was Undertaken in Murree (Hill Resort) in September, 2007.
- 15 Locations were Selected for Ambient Air Quality Monitoring of NO_2 and SO_2 .
- Vehicular Emission Testing was part of the study.
- Personal Passive Samplers were Attached to 37 Children to Monitor the Exposure Level.



Relationship Between NO2 Concentraion and Distance from Main Road



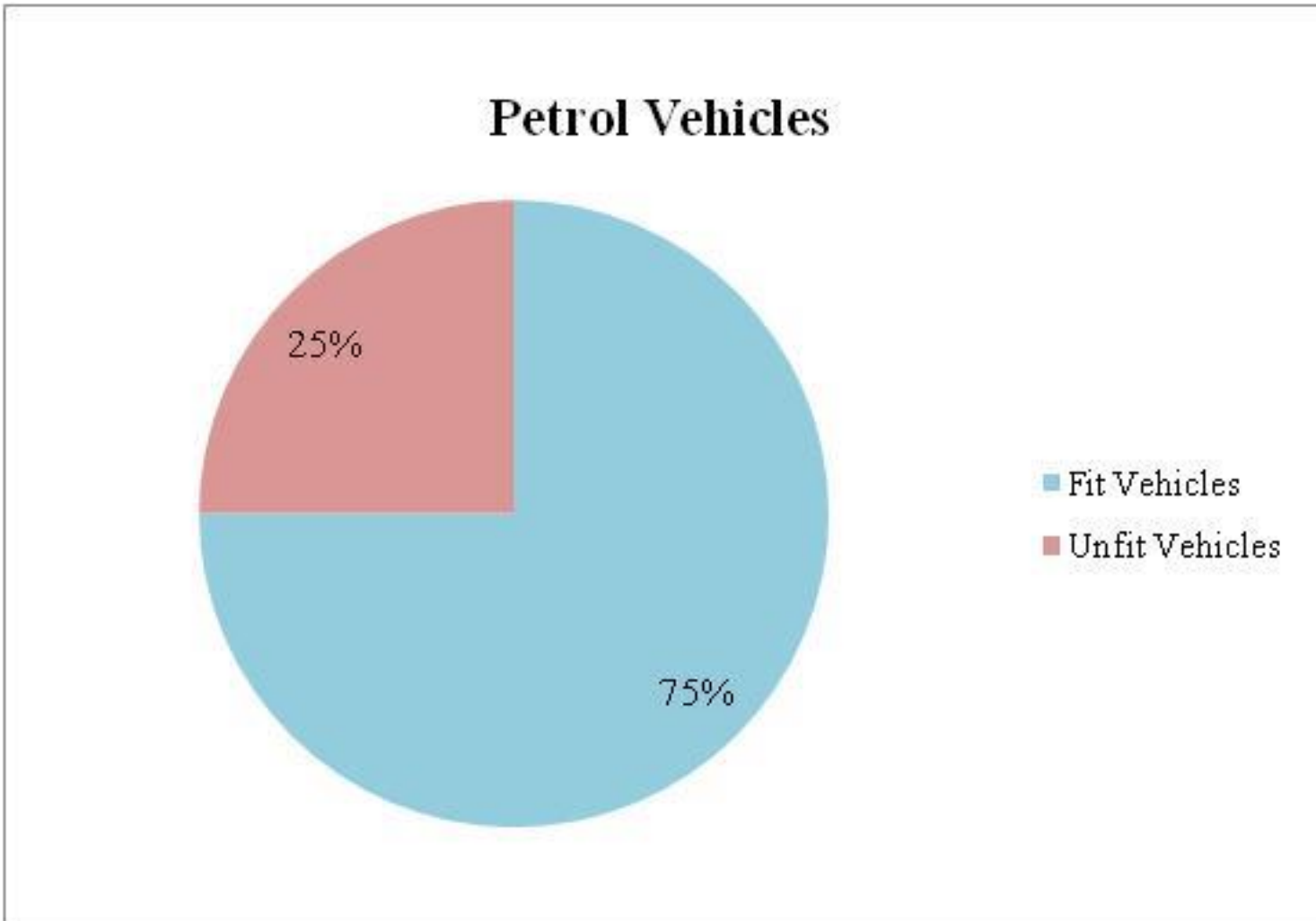


Results

- NO_2 and SO_2 concentration decrease with Increase in distance from the road.
- The samplers installed at more than 30 meters Distance from the road have More or Less Stable Concentration of NO_2 and SO_2 .
- Children of Schools Away from the Roadside Area are Less Exposed to Air Pollutants

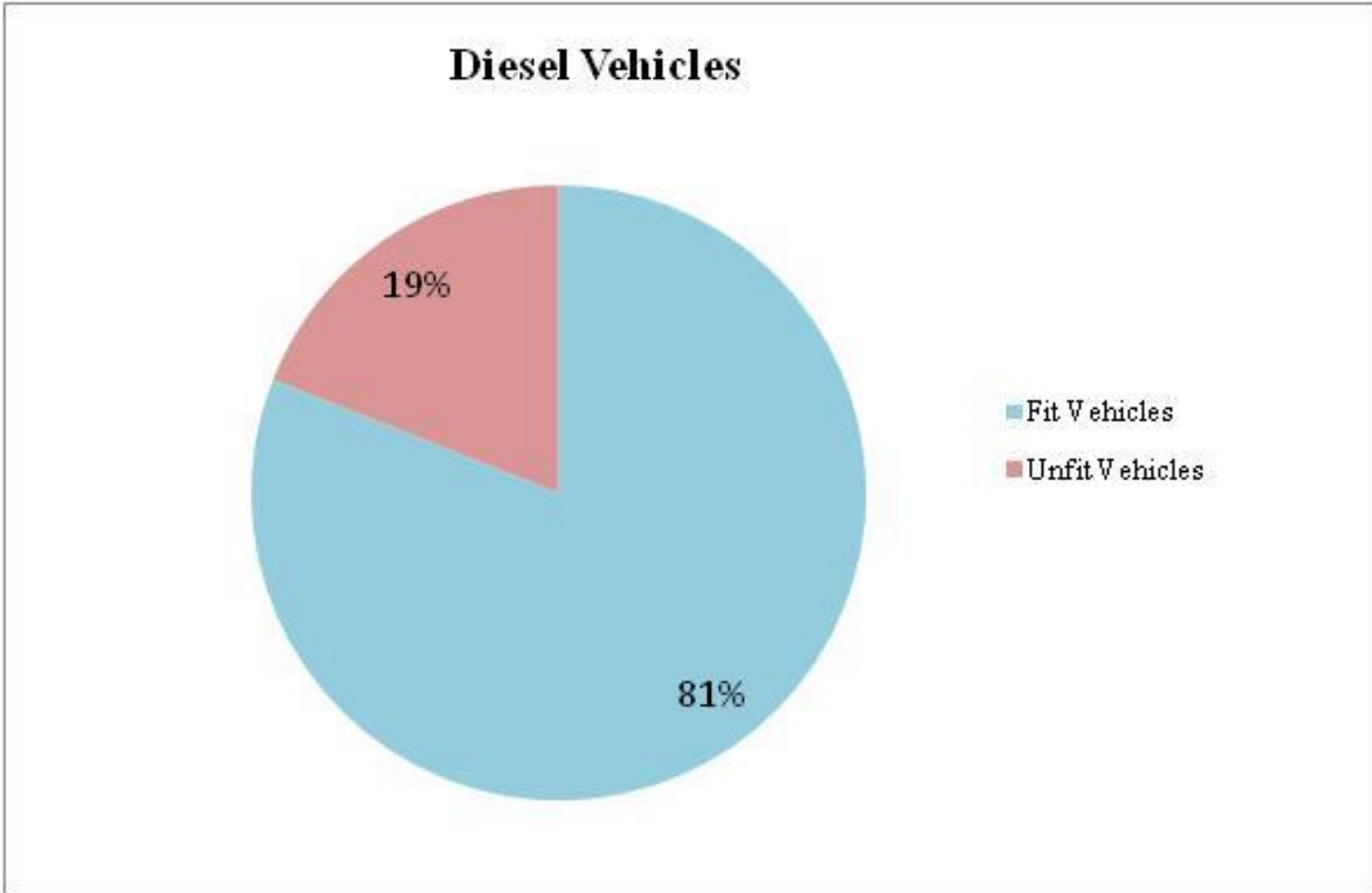


Emission Testing of Petrol Vehicles





Emission Testing of Diesel Vehicles





Challenges & Difficulties

- Some institutional issues also impacted the functioning of monitoring activities under Malé Declaration.
- Communication and Logistical Constraints for Supervising & Monitoring the Site
- Equipments are now completely non-functional due to non-maintenance and consumables' non-availability.
- High Volume Sampler is not functional due to unavailability of filter papers since 2009.



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- Non-Delivery of 'Kjeldhal Distillation System (Model UDK 142) & Titrator (Model Titroline Easy of Scott Germany)' by M/s Modern Lab. Lahore for which Payment has already been made by UNEP.
- Un-availability of funds for Malé station has been a real challenge for past few years.



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- Currently, the **Regional Centre on Crops and Vegetation Monitoring** – Pakistan has no coordination with Pak-EPA.
- No technical documents and information about on-going research activities being shared with Pak-EPA.



Capacity Building

- Field Staff Need More Training
- Training on Emission Inventory development required for NIA and some other experts from Pakistan
- Hands-on trainings for monitoring of criteria pollutants



Improvement of Monitoring Station

- The existing laboratory needs to be improved with more analytical instruments.
- Considering the issue of black carbon, installation of Aethalometer is highly required for real-time BC monitoring.
- The existing set-up maybe replaced with the automated monitoring station with real-time data monitoring for all the pollutants.
- It will help ensure continuous air quality monitoring.



Thanks